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WITH 31 PLATES AND 4 TEXT FIGURES

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THE PHILIPPINE
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VOL. 26 JANUARY, 1925 No. 1

THE ESSENTIAL OIL OF CALANTAS WOOD

By WALTER L. BROOKE
Chemist, Bureau of Science, Manila

ONE PLATE

INTRODUCTION

The principal use of calantas wood (*Toona calantas* Merr. and Rolfe) is the manufacture of cigar boxes. As the supply of calantas timber becomes more nearly depleted, the price of calantas cigar boxes approaches a prohibitive figure. Tan͠gile (*Shorea polysperma* Merr.) closely resembles calantas except that the former is odorless. At the present price, a cigar box made of calantas wood costs 24 centavos, whereas one of the same size made of tan͠gile costs only 12 centavos. The purpose of this investigation was to determine the nature of the calantas odor, to isolate the odoriferous substance from calantas waste material, as sawdust, and to impregnate tan͠gile and perhaps other woods with the calantas odor.

NATURE OF THE ODOR

Some calantas sawdust was placed in a Freas drying oven at 100° C. Even after several hours, the odor was still easily perceptible. When the sawdust was left in the drying oven at 100° C. overnight, the odor, although still present and detectable, was much fainter.

About 10 grams of sawdust were extracted in a Soxhlet apparatus with alcohol; the alcohol was evaporated before an electric fan, and the residue examined. It had a reddish color and a true calantas odor. Extraction with acetone, benzol, and ether gave similar results. Steam distillation isolated an odoriferous oil. In one experiment, 600 grams of well-seasoned sawdust, supplied by the Bureau of Forestry, gave 7 cubic centimeters of oil and in another trial 1,100 grams of sawdust from a Palawan sawmill gave only 3.5 cubic centimeters of oil corresponding to yields of 1.16 per cent and 0.32 per cent, respectively.

PROPERTIES OF THE OIL

The steam-distilled oil is white and opaque. When allowed to stand in a desiccator, it assumes a yellowish tinge which deepens with time. The oil as obtained from steam distillation was centrifuged, separated from the water by decantation, and dried in a calcium chloride desiccator for two weeks. Its constants are recorded in Table 1.

TABLE 1.

	Sample 1.	Sample 2.
Specific gravity $\frac{15^\circ}{15^\circ}$	0.9498 0.9494	------ ------
Specific gravity $\frac{30^\circ}{30^\circ}$	------ ------	0.9551 0.9549
Refractive index	1.5037	1.5038
a^{29}_{D}	—28.04	—32.87

The optical rotation was determined by observing the rotation in a 100-millimeter tube in a Schmidt and Hänsch saccharimeter and using the following formula:

$$a = \frac{\text{Ventzke}^\circ \times 0.34657}{\text{Sp. gr.} \times \text{length of tube in dm}}$$

The oil is easily soluble in ether, glacial acetic acid, chloroform, nitrobenzene, or carbon tetrachloride; it is less soluble in benzene or alcohol. It will not solidify even if chilled to —10° C. By concentrated sulphuric acid, it is completely polymerized. The oil has neither saponification nor acid number. It does not give color reactions with ferric chloride or Schiff's reagent, but decolorizes potassium permanganate and bromine water. The oil becomes thicker upon standing in the air and the characteristic odor of the calantas wood is then more pronounced.

One gram of the oil absorbed 2.149 grams of bromine when treated with bromine-carbon tetrachloride reagent in 20 per cent excess, but only 2.128 grams when a 10 per cent excess of reagent was used. The excess bromine was determined by titration with sodium thiosulphate after the addition of potassium iodide and a little starch paste as indicator. Then a little potassium chlorate was added to the titration mixture, which was allowed to stand for one hour. In each trial, only 0.8 cubic centimeter of sodium thiosulphate was required to neutralize the liberated iodine, thus showing that practically all of the bromine absorbed was bromine of addition and not of substitution.

The distillation of 16 cubic centimeters of oil, dried in a Freas oven at 100° C. overnight, gave the following data:

TABLE 2.

cc.		°C.
2	distilled below	268
10	distilled below	274
11	distilled below	276
12	distilled below	279
13	distilled below	283
14	distilled below	288
15	distilled below	290

The oil distilling between 268° C. and 279° C. was used to make the hydrochloride derivative. Approximately one-half of the oil distilled around 274° C.

Vacuum distillation is not wholly satisfactory because much of the oil settles on the sides of the Brühl flask instead of condensing and dropping into the receiving vessel. The data obtained from a vacuum distillation are given in Table 3.

TABLE 3.

Time.	Temperature.	Fraction.	Refractive index.
a. m.	*°C.*		
11.00	28	1	1.5030
11.06	108		
11.11	162		
11.16	172	2	1.5035
11.21	168		
11.26	170		
11.31	176	3	1.5043
11.35	203	4	1.5045
11.37	224	5	1.5051

The regular laboratory vacuum of 21 to 23 inches was used. The optical rotation of fraction 1 when determined in a 50-millimeter tube in a saccharimeter was —14.16 at 29° C. $a\frac{29}{\mathrm{D}}$ for fraction 2 was —17.88.

The optical rotation of the dried oil before distillation and of the fraction boiling around 274° C. was determined in chloroform solution and computed by the following formula:

$$a = \frac{\text{Ventzke}^\circ \times 100 \times 0.34657}{\text{Specific gravity} \times \text{per cent} \times \text{length of tube in dm}}$$

TABLE 4.

	Undistilled oil.	274° C. fraction.
Specific gravity of solution	1.3908	1.3997
Ventzke°	—13.8	—6.8
Per cent solution	10.489	8.945
a^{30}_{D}	—32.79	—18.82

From this experiment, it appears that distillation destroys part of the optical activity, or that the portion boiling in the neighborhood of 274° C. has a lower rotatory power than the original oil.

THE HYDROCHLORIDE DERIVATIVE

The chemical reactions of the oil, the high refractive index, the negative rotation, and the large amount which distilled around 274° C. suggested that the oil might contain the sesquiterpene cadinene. When 13.2 cubic centimeters of the oil boiling between 270° C. and 280° C. were dissolved in ether, cooled with ice, and dry hydrochloric acid gas passed into the solution, a solid crystalline derivative was obtained. At first the ether solution was colorless, but it gradually changed to violet which deepened into dark blue. When the crystals were filtered from the ether mother liquor the bluish substance remained in the ether. The crystals were white when thoroughly drained and washed with a little absolute alcohol. After several recrystallizations from ethyl acetate, the crystals melted at 118° C. The crystals are represented in Plate 1, fig. 1.

Since no cadinene dihydrochloride was available in the laboratory to make a mixed melting-point determination, some was prepared from supa oil, according to Clover's directions.[1] The crystals prepared from supa oil, after several recrystallizations from ethyl acetate, melted at 118° C. The melting point of approximately equal parts of the calantas and supa hydrochloride derivatives was 117° C. The supa hydrochloride crystals are illustrated in Plate 1, fig. 2.

---

[1] Philip. Journ. Sci. 1 (1906) 191.

The optical rotation of the hydrochloride derivative of the calantas and supa oils was determined in chloroform solution. The data from which the rotation was computed are given in Table 5.

TABLE 5.

	Calantas.	Supa.
Per cent of solution	2.437	2.848
Specific gravity of solution	1.456	1.452
Rotation in Ventzke°	—4.1	—4.8
$\alpha\frac{30}{D}$	—40.0	—10.2

Wallach and Conrady[2] give the rotation of cadinene dihydrochloride as —36.82, but they determined it in a 7.2 per cent solution. The crystals formed on a microscopic slide by the spontaneous evaporation of an ethyl acetate solution of the calantas hydrochloride derivative are represented in Plate 1, fig. 3.

SUMMARY

1. The essential oil obtained from calantas wood (*Toona calantas* Merr. and Rolfe) is described and its constants are given.
2. Cadinene is shown to be one of the principal constituents of this new wood oil.

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[2] Ann. der Chem. **252**: 144.

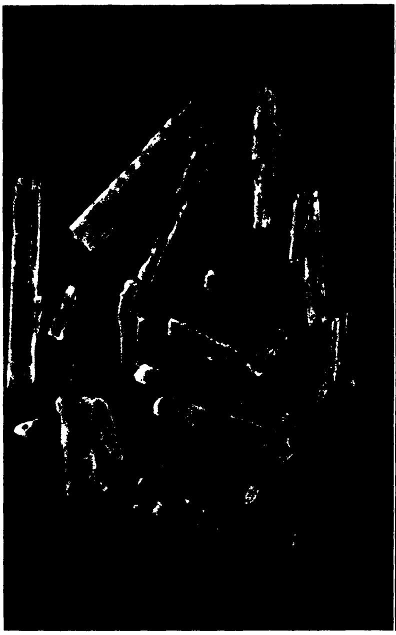
ILLUSTRATION

PLATE 1

FIG. 1. Cadinene dihydrochloride crystals obtained from calantas oil by slow crystallization from an ethyl acetate solution.

2. Cadinene dihydrochloride crystals obtained from supa oil.

3. Crystals of the dihydrochloride derivative of calantas oil obtained by the rapid evaporation of an ethyl acetate solution on a microscopic slide.



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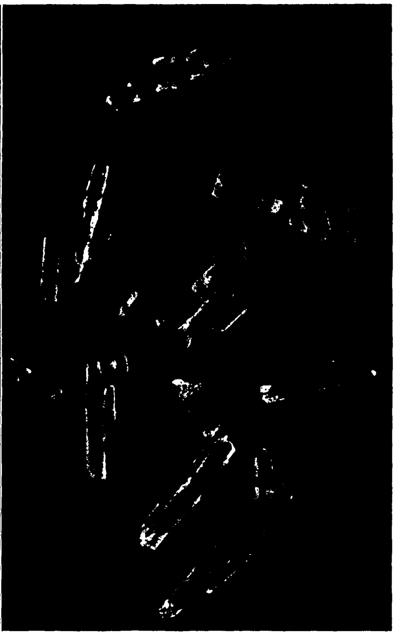

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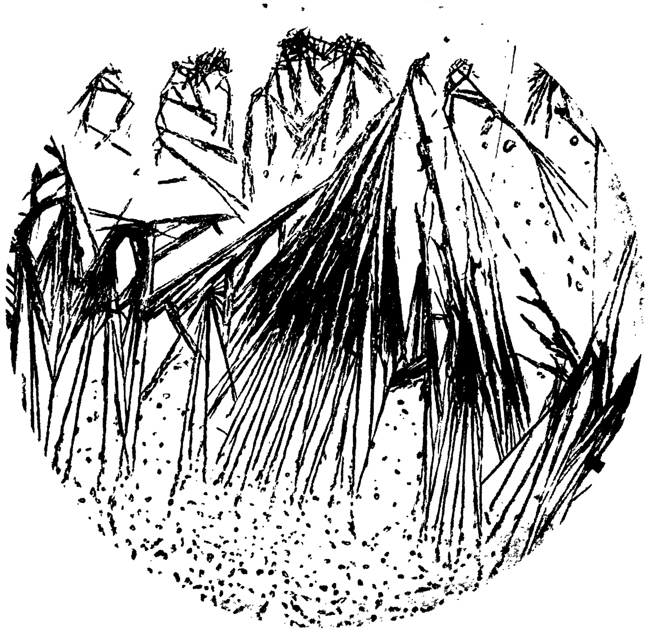

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PLATE 1.

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CHEMICAL AND PHARMACODYNAMIC INVESTIGATION ON STROPHANTHUS LETEI MERRILL[1]

By A. H. WELLS

Chief, Division of Organic Chemistry, Bureau of Science, Manila

and

FAUSTINO GARCIA

Associate Professor, Department of Pharmacology, College of Medicine University of the Philippines

THREE PLATES

In the literature discussing the approximately thirty species of the genus *Strophanthus,* natural order Apocynaceæ, no mention is made of *Strophanthus letei* Merr. As far as is known, this species is indigenous to the Philippine Islands, and at present is found only in La Union Province, Luzon.

The type specimen of *Strophanthus letei* Merr. (see Plate 1) was collected by R. Lete in the barrio of Poro, near San Fernando, La Union Province, at an altitude of 4 meters above sea level. It is a vine, sometimes growing in the form of a small tree, 3 to 4 meters high. Repeated inquiries among the inhabitants of La Union Province reveal no use for this plant, either medicinal or domestic. In the investigation of the *Strophanthus* species, it appears that in the past usually the seeds only were taken into consideration. The seeds of many of the species contain strophanthin, strophanthic acid, kombic acid, ouabain, and other compounds of similar nature. In this investigation we had only a few seeds, which gave no reaction for strophanthin. Acknowledgment is due Dr. Leon Ma. Guerrero for having furnished and identified the botanical material used. Regarding *Strophanthus letei* Merr., Doctor Guerrero makes the following statement:

STROPHANTHUS LETEI

Esta especie hallada por primera vez por el farmacéutico Sr. Rafael Lete, estáblecido en San Fernando, La Unión, ha sido denominada específicamente así por el Sr. Elmer D. Merrill cuya descripción aun no se ha publicado.

---

[1] The chemical work was done in the laboratory of the division of organic chemistry of the Bureau of Science, Manila, and the pharmacodynamic work was done in the department of pharmacology of the College of Medicine of the University of the Philippines.

Los naturales de la provincia desconocen por completo esta enredadera de propiedades venenosas. La denominan *sarasara,* en ilocano, aunque este apelativo también se aplica al *Strophanthus cumingii* DC.

La corteza de esta última especie, al parecer más difundida en el archipiélago, es la que con frequencia se utiliza en forma de extracto por los mangianes de Mindoro y los tagbanuas de Palawan que enbadurnan con él sus flechas y jaras destinadas a la caza de venados, monos y aves.

Chemical analysis.—The bark was taken from the stems and from the roots and extracted with water, and the clear filtrate was evaporated to dryness under reduced pressure and purified by the lead acetate method combined with repeated precipitations with ether.

TABLE 1.—*Analyses of bark of Strophanthus letei Merr.*

	Stems.	Roots.
Moisture per cent	58.2	62.8
Crude compound do	1.7	3.1
Purified compound do	0.9	2.1

All attempts to crystallize the compound failed; consequently, it was not deemed advisable to make a combustion determination on this amorphous substance. The purified product is stable in the form of a light brown, dry powder. It is very soluble in water and gives a clear sparkling solution which foams readily. It melts with decomposition at 152° C. Unlike strophanthin this substance, when treated with concentrated sulphuric acid in the cold, gives an orange brown coloration instead of a green. Likewise, when heated with sulphuric acid, a color of Rood's violet (1) turning to reddish brown is produced. We were unable to obtain any olive or other green colorations which are claimed as characteristic of strophanthin. The compound readily reduces Fehling's solution in the usual way. A 2.5 per cent hydrochloric acid solution quickly hydrolizes the compound, giving a residue insoluble in water but soluble in ordinary organic solvents. Treated with acetic anhydride it yields an acetyl derivative. The ferric chloride test for strophanthin is found negative when applied to the original compound. Concentrated nitric acid oxidizes the original substance, giving off gas, probably carbon dioxide, and forming oxalic acid and a mixture of insoluble amorphous nitro compounds. These nitro derivatives are white, turning to orange upon exposure to light. They crystallize from acetone and methyl alcohol in irregular yellow plates of flat prisms. Eighty per cent of the nitro compound is soluble in ether; the remaining 20 per cent is soluble in amyl and ethyl alcohol, and gives a darker yellow solution than the ether soluble compound. When the dark orange solution of the sodium salts of this nitro compound is treated with hydrochloric acid it becomes colorless and a white flocculent precipitate is obtained together with a compound which has the characteristics of a saponin. The original nitro compounds are soluble in all ordinary organic solvents including amyl acetate, ethyl alcohol, amyl alcohol, carbon tetrachloride, chloroform, and others.

The compound may be classed as a glucoside, or saponin. That it is not strophanthin is shown by the facts that it does not give any of the color reactions or characteristic precipitation tests of this drug; that it has a different melting point and different solubility in water and organic solvents; and that it reduces Fehling's solution without previous hydrolysis and decomposition with acids. This glucoside is somewhat similar to pseudostrophanthin or the strophanthin of Arnaud.

PHARMACODYNAMICS OF STROPHANTHUS LETEI MERRILL

The purified compound or the amorphous powder extracted by one of us from the bark of the stems and the roots of *Strophanthus letei* Merr., was dissolved in 0.7 per cent saline solution and injected into the anterior lymph sacs of several frogs. Different doses were employed and those that were found fatal showed, first, the symptom of depression. On exposure of the hearts of the dead frogs, the ventricle was observed to be fully contracted and the auricles markedly dilated. With the heart of a pithed frog already exposed when the drug was injected into the posterior lymph sac, the effects were at first slowed, regular, and strengthened ventricular contractions, which later became irregular with the auricles contracting more than the ventricle. The slowing of ventricular contraction continued until the heart stopped in systole with the auricles markedly distended. Connecting the apex of the heart with a heart lever for recording, the tracing obtained under *Strophanthus letei* compares favorably with that produced by ouabain or crystalline strophanthin. Characteristic tracings of the movements of the frog hearts under toxic doses of *Strophanthus letei* and ouabain are shown in Plate 2, figs. 1 and 2.

The upstroke in the record indicates systole, and the downstroke, diastole. The drugs were injected into the dorsal lymph sac after the tracing under normal condition had been taken. As the dose administered in each case was large, the maximum effects were manifested a few minutes after injection. The diastole in both tracings rapidly becomes less and less complete, until the ventricle finally ceases, fully contracted. The tone is markedly increased under *Strophanthus letei* and comparatively less under ouabain. Both heartbeats are slowed. In *Strophanthus letei the* slowing four minutes after injection is from 86 to 46 per minute.

Similar tracing is obtained when the heart of the frog is perfused in situ with 1 : 10,000 dilution of .the powder extracted from the bark of *Strophanthus letei* in Ringer's solution. However, if the perfusion fluid is replaced by Ringer's solution as soon as the effect is manifested, the heart continues to beat strongly for a rather long time. The effect of *Strophanthus letei* by heart perfusion is comparable with that produced by adrenaline. Tracings in Plate 2, figs. 3 and 4, are shown as examples. In both figures the tracings were obtained by connecting the apex of the heart of a pithed frog with a heart lever for recording. The solution was perfused through the ascending vena cava, the heart, and out through the cut aorta. Before perfusing with the drug, the heart was allowed to weaken by perfusion of Ringer's solution. If perfusion of the drug is started when the heart is contracting strongly, the effect of *Strophanthus letei* is very much less as compared with that produced by adrenaline. The tracing in Plate 2, fig. 3, shows that *Strophanthus letei* produced marked increase in the systole and slight increase in the diastole. The slowing of the heartbeat was pronounced and persisted a long time after *Strophanthus letei* solution was replaced by Ringer's solution. About six minutes after the start of the perfusion of the drug, the heart contraction was greatly slowed and later it became irregular, for about three minutes. The heart then recovered, exhibiting slow but strong and regular contractions.

The hæmolytic effect of the powder extracted from the bark of *Strophanthus letei* was determined, and the results are shown in Table 2. It will be seen from the table that, with the strengths of 0.8 per cent and above mixed with an equal quantity of defibrinated blood, complete hæmolysis is produced in half an hour. There is partial hæmolysis with 0.6 per cent, very slight hæmolysis with 0.5 per cent, and with 0.4 per cent or lower no hæmolytic effect was observed.

TABLE 2.—*Hæmolytic effect of the powder extracted from the bark of Strophanthus letei Merr.*

Time.	Per cent of the powder in physiologic saline solution.							Remarks.
	1	0.8	0.6	0.5	0.4	0.2	Saline solution.	
a. m. 11.05	Red and turbid.	Red and turbid.	Red and turbid.	Red and turbid.	Red and turbid.	Red and turbid.	Red and turbid.	5 mils of each reagent mixed with 5 mils of defibrinated blood.
11.35	Dark red and transparent.	Dark red, transparent.	Deep red and partly transparent.	do	do	do	do	
p. m. 2.00	do	do	do	do	do	do	do	Each reagent was centrifuged for an hour and left in the ice box overnight.
a. m. [a]8.25	Dark red and transparent with no sediment.	Dark red and transparent with no sediment.	Dark red supernatant fluid and moderate amount of sediment.	Red supernatant fluid and plenty of sediment.	Yellowish clear supernatant fluid and plenty of sediment.	Yellowish clear supernatant fluid and plenty of sediment.	Yellowish clear supernatant fluid and plenty of sediment.	

[a] The following day.

TABLE 3.—*Symptoms produced by powdered extract of Strophanthus letei Merr. in a female cat*[a] *weighing 1.41 kilograms.*

[Date of experiment, November 14, 1923.]

Time.	Pulse per minute.	Respiration per minute.	Remarks.
p. m.			
1.45	138	56	
1.50	132	52	
1.55	132	46	
1.58	----------	----------	Subcutaneous injection of 1.41 mils of 0.5 per cent of the powdered extract of *Strophanthus letei*. Cried and struggled during the injection.
2.05	132	56	
2.10	132	46	
2.15	138	60	
2.20	132	56	
2.25	126	60	Urination.
2.30	102	68	Slight salivation.
2.35	90	86	
2.40	84	84	Salivation, nausea, and retching.
2.45	84	80	Defecation.
2.50	78	82	
2.55	120	132	Defecation. Mild convulsion occurring at intervals.
3.00	150	132	
3.05	174	132	
3.10	180	156	Much salivation.
3.15	186	150	Defecation.
3.20	204	156	Pulse very weak and irregular.
3.25	0	4	Died in a few seconds after a mild convulsion.

[a] Cat was tied to the board throughout the experiment.

Table 3 shows the toxic effects of *Strophanthus letei* in cat. Similar effects are obtained by intramuscular and intravenous injection of the drug; by mouth, the lethal effect could not be observed on account of vomiting which occurred a few minutes after administration. In dog the effects are qualitatively identical. The salivation, rapid respiration, and slowing of the pulse rate are characteristic. With fatal doses, the slowing of the pulse rate is soon replaced by rapid and irregular heart beats until they finally cease. Urination and defecation frequently occur during the middle of the experiment. Just before death the animals generally manifest convulsion, with loud cry, followed by relaxation and a few gasping respirations.

The effects of *Strophanthus letei* on the heart and blood pressure in mammals are graphically shown in Plate 3, fig. 1. The tracing in the figure was obtained from the following experiment: A dog was anæsthetized with morphine and chloretone and insufflation respiration was maintained throughout. The heart and carotid artery were exposed, and apparatus for recording heart volume and blood pressure changes was arranged. A large dose of *Strophanthus letei* was purposely injected into the vein to observe the rapid changes of the effects. The effects as shown in Plate 3, fig. 1, can be divided into three stages. The first stage includes the first manifestation of the effects of the drug, such as the rapid increase in the amplitude of the downstroke and the upstroke in the cardioplethysmogram, indicating increased systole and diastole, respectively, and slight slowing of heart contraction. The blood pressure is rapidly raised, followed by a slight primary depression and then a secondary rise. The second stage is characterized by a marked slowing of the heartbeat and a great variation of the blood pressure change. These effects as shown in the tracings are characteristic of a marked vagus activity. The vagus action in this stage is still supported by the fact that this great variation of the blood pressure change does not occur when the vagi are cut previous to the injection of the drug. The third stage consists in a return to a regular and slightly slower rate and greater amplitude of contraction than normal. The blood pressure is further raised or gradually returns toward the normal level with diminished oscillatory changes. The third stage in this case is terminated by diminished and irregular contraction and then cessation of the heartbeat, with the corresponding sudden fall of blood pressure to nearly the base line. When a large but subfatal dose is administered, similar changes of effects are observed, with the exception that the duration of each stage is longer and that the third stage is alternated with the effects of slight vagus activity. The blood pressure is maintained above normal for about thirty minutes. A typical example of the effects of a large but subfatal dose of *Strophanthus letei* is shown in Plate 3, fig. 2. In the last part of the tracing of the figure, the clockwork of the drum was stopped at intervals to abbreviate the records. Plate 3, fig. 2, shows, in the first stage, that there is a gradual increase in the systole and diastole of the heartbeat, with a corresponding rise of blood pressure, slight primary depression and, then, secondary rise. The vagus activity in the second stage occurred at long intervals at the beginning and gradually became frequent and stronger. The third stage sets in with diminution of oscillary blood pressure change and gradual fall of blood pressure toward the normal level. The blood pressure in this stage is generally further raised when the duration of the second stage is short while there is a tendency to fall gradually when the second stage is prolonged. The alternation of slight vagus activity is shown in the illustration to occur when the blood pressure has returned to the normal level.

EFFECT ON THE RESPIRATION

The changes in the rate and depth of respiration produced by *Strophanthus letei* were studied by the use of a stethograph. An example of the result is shown in a tracing, or stethogram, in Plate 3, fig. 2. It will be seen that after intravenous injection of 1 centigram of the powder extracted from *Strophanthus letei* there were slight irregularity and diminution in the depth of respiration for about five minutes, followed by regular and gradual increase in rate and depth, lasting for about seven minutes. The increase in rate and depth of respiration coincided with the highest level of blood pressure and by the time the latter began to lower, the respiration had already returned to its normal condition. This transient stimulation of respiration has also been observed in fatal doses of *Strophanthus letei* administered by subcutaneous, intramuscular, and intravenous injections. With 5 milligrams of the powder by vein, or approximately 0.5 milligram per kilogram of body weight, the effects were manifested only in the blood pressure but not in the respiration. With a repetition of the same dose after the blood pressure had returned to its normal level, or twenty-five minutes after the first dose, the effect on the respiration was similar to that produced by 1 centigram of the drug, as shown in Plate 3, fig. 2.

STRENGTH OF THE PREPARATION

The powder extracted from the bark of *Strophanthus letei* was assayed by the use of Hatcher's cat method,(2) with some modifications. The method consists in giving ether anæsthesia to the cat during operation and continuing administration of the anæsthesia during the injection if the cat struggles or shows sign of pain. The drug is diluted in such a way that the estimated fatal dose would be contained in from 8 to 15 mils. The solution is placed in the burette and exact readings before and after the injection are noted. Approximately 1 mil of the solution is injected into the vein at one-minute intervals until about two-thirds of the estimated fatal dose have been given, and then 0.5 mil every two minutes is given until the cat dies. The results of the experiments under *Strophanthus letei* and ouabain are shown in Table 4.

TABLE 4.—*Experiments with cats.*

POWDERED EXTRACT OF THE BARK OF STROPHANTHUS LETEI.[a]

Date.	Sex.	Condition.	Weight.	Dilution.	Total.	Minimum lethal dose per kilogram.	Time to kill.
1923			*kg.*	*Per cent.*	*mils.*	*mg.*	*min.*
November 14	F	Good	3.00	0.05	12.5	2.08	18
1924							
July 1	F	do	2.27	0.05	10	2.20	22
July 1	M	do	2.81	0.05	12.6	2.23	28
July 2	M	do	3.25	0.05	11.5	1.77	20
July 2	M	do	2.62	0.05	9.5	1.81	16
July 2	F	do	2.40	0.05	9.0	1.88	19
OUABAIN.[b]							
1923							
October 25	F	Good	3.09	0.002	15	0.097	25
1924							
July 3	M	do	3.30	0.002	19.4	0.090	32
July 3	F	do	2.13	0.002	11.5	0.108	30
July 3	M	do	2.25	0.002	12	0.107	18

[a] Average minimum lethal dose of *Strophanthus letei* per kilogram is 1.995 milligrams; in round numbers, the minimum lethal dose per kilogram is 2 milligrams.

[b] Average minimum lethal dose of ouabain per kilogram is 0.1005 milligram, or practically equal to 0.1 milligram per kilogram, suggested by Hatcher and Brody as the cat unit.

Table 4 shows that the average minimum lethal dose of ouabain per kilogram of cat used in Manila is equivalent to the unit for cats suggested by Hatcher and Brody. The minimum lethal dose of the powder extracted from the bark of the roots and stems of *Strophanthus letei* per kilogram is 2 milligrams. The strength, therefore, of the powder is one-twentieth that of ouabain.

SUMMARY AND CONCLUSIONS

1. The bark of the roots and stems of *Strophanthus letei* contains a saponin to the extent of 2.1 per cent for the former and 0.9 per cent for the latter.
2. The compound is somewhat similar to pseudostrophanthin, but does not give tests for true strophanthin.
3. This saponin, in the form of amorphous brown powder, is easily extracted by water and purified by the lead acetate method combined with repeated precipitations with ether.
4. The amorphous powder slows the heart beat, increases the tone, and augments the heart contraction.

5. The blood pressure is raised by the drug in animals, the rise lasting about thirty minutes.

6. The depth and rate of respiration are increased by a large dose of the drug.

7. All the effects mentioned are obtained by subcutaneous, intramuscular, and intravenous injection. By mouth, the drug produces emesis a few minutes after administration.

8. Solutions of the powder from 0.4 per cent and below produced no hæmolytic effect, but hæmolysis is produced with a solution of 0.6 per cent and above.

9. By the use of the biological assay cat method, the powder was found to possess one-twentieth the strength of ouabain.

REFERENCES

1. RIDGWAY, ROBERT. Color Standards and Color Nomenclature. Washington, D. C. (1912 pl. 11, 65. RR-V. *i.*
2. HATCHER and BRODY. Am. Journ. Pharm. 82 (1910) 360.

ILLUSTRATIONS

PLATE 1

Strophanthus letei Merr.

PLATE 2

FIG. 1. Effect of powdered extract from the bark of *Strophanthus letei* Merr. on frog's heart.
2. Effect of ouabain on frog's heart.
3. Effect by perfusion of the powder (*Strophanthus letei* Merr.) on frog's heart.
4. Effect by perfusion of adrenaline on frog's heart.

PLATE 3

FIG. 1. Effect of *Strophanthus letei* Merr. on the heart and blood pressure.
2. Effect of *Strophanthus letei* Merr. on the blood pressure and respiration.

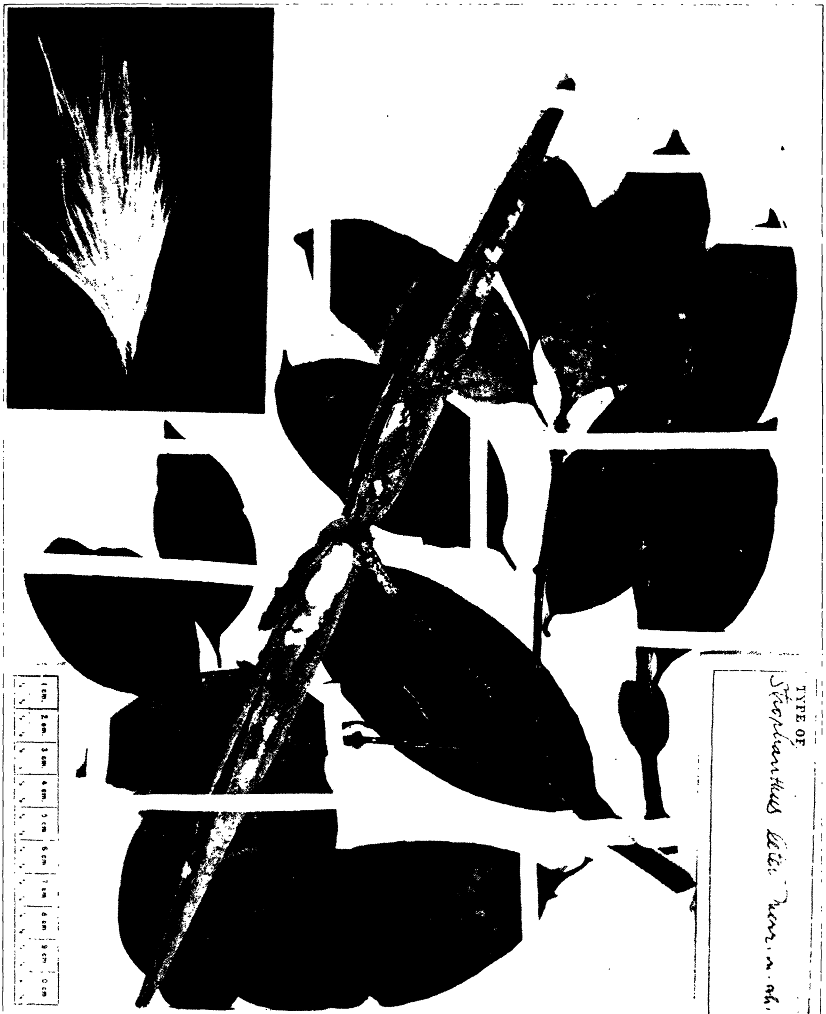

PLATE 1. STROPHANTHUS LETEI MERR.

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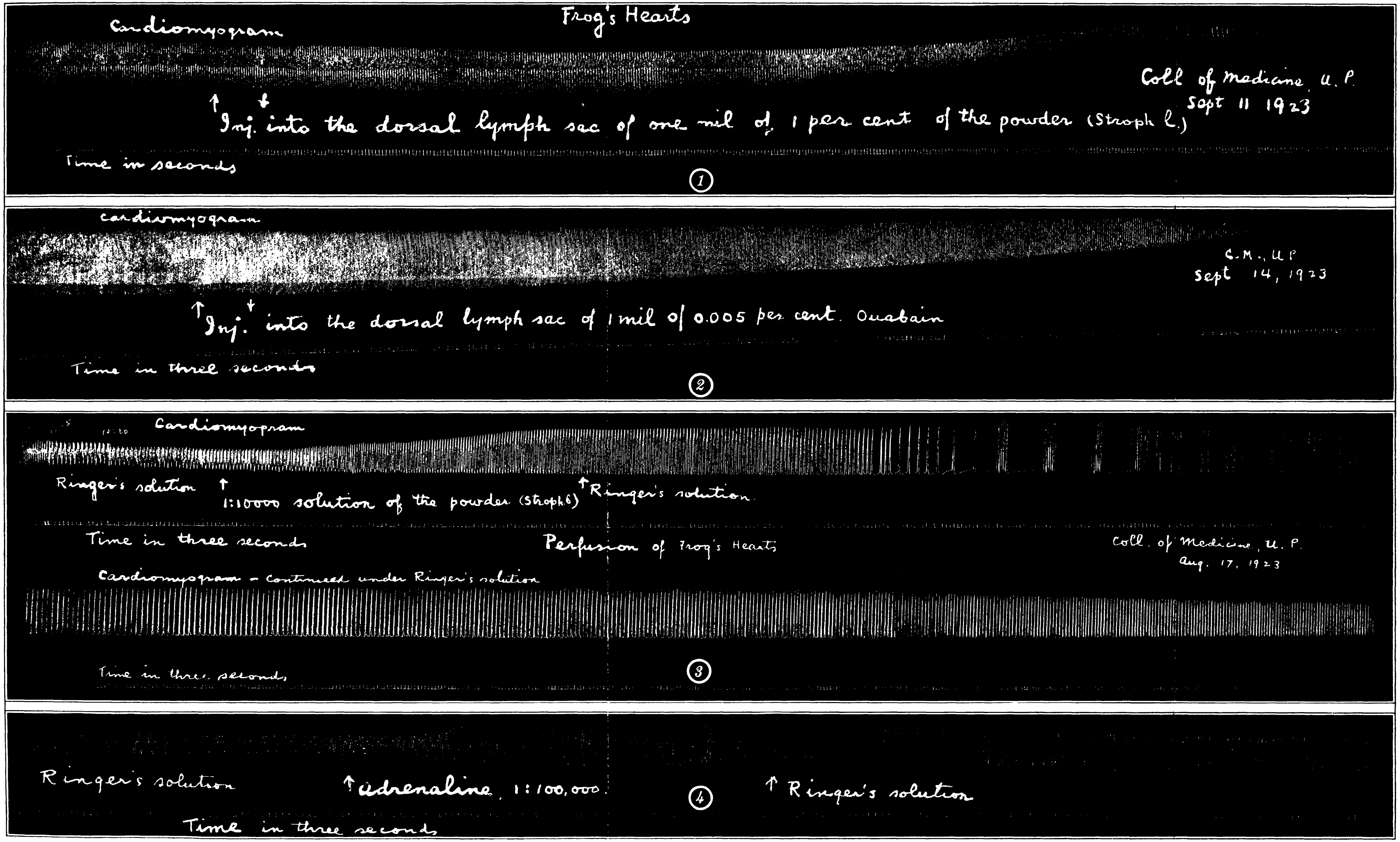
Frog's Hearts
Cardiomyogram
Coll of Medicine U. P.
Sept 11 1923
↑ Inj. into the dorsal lymph sac of one mil of 1 per cent of the powder (Stroph l.)
Time in seconds
①
cardiomyogram
C. M., U. P.
Sept 14, 1923
↑ Inj. into the dorsal lymph sac of 1 mil of 0.005 per cent. Ouabain
Time in three seconds
②
Cardiomyogram
Ringer's solution
↑ 1:10000 solution of the powder (Stroph 6)
↑ Ringer's solution.
Time in three seconds
Perfusion of Frog's Hearts
Coll. of Medicine, U. P.
Aug. 17, 1923
Cardiomyogram – Continued under Ringer's solution
Time in three seconds
③
Ringer's solution
↑ adrenaline, 1:100,000
④
↑ Ringer's solution
Time in three seconds

PLATE 2.

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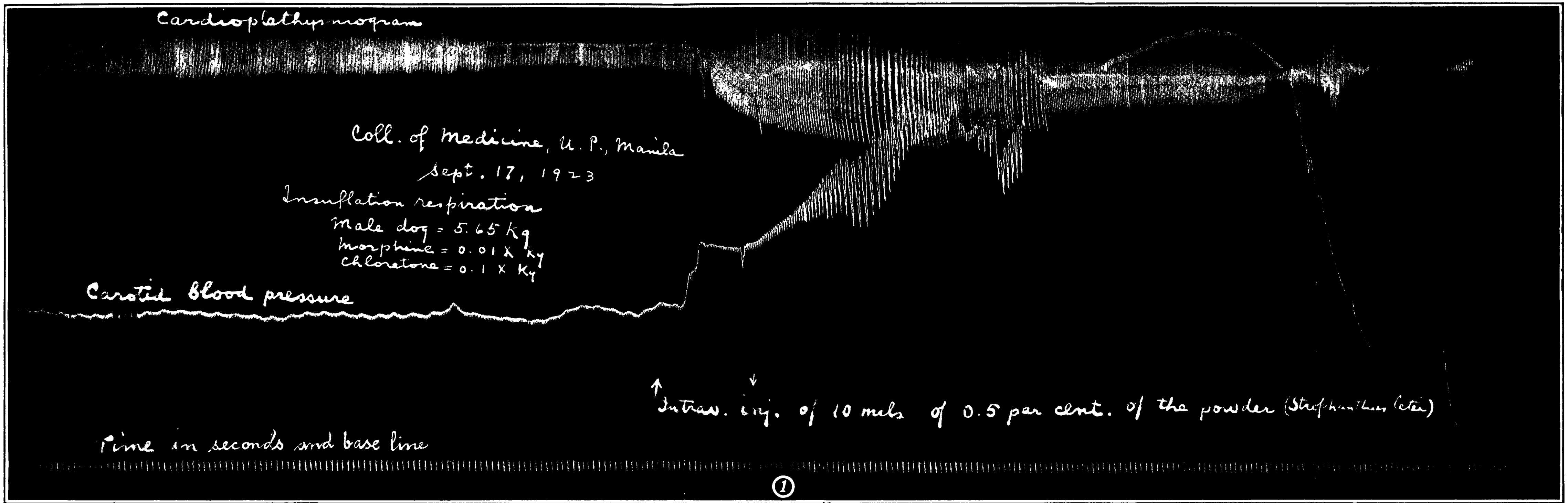
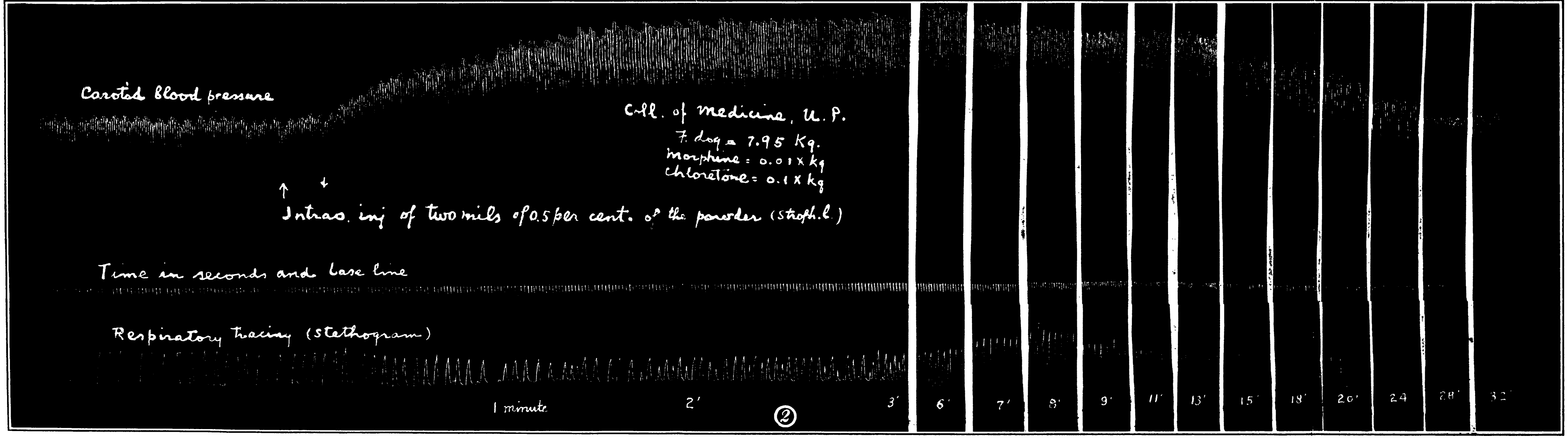

Cardioplethysmogram
Coll. of Medicine, U.P., Manila
Sept. 17, 1923
Insufflation respiration
Male dog = 5.65 Kg
Morphine = 0.01 X Kg
Chloretone = 0.1 X Kg
Carotid blood pressure
↑ ↓
Intrav. inj. of 10 mils of 0.5 per cent. of the powder (Strophanthus letei)
Time in seconds and base line

①


Carotid blood pressure
Coll. of Medicine, U.P.
♀ dog = 7.95 Kg.
Morphine = 0.01 X Kg
Chloretone = 0.1 X Kg
↑ ↓
Intrav. inj of two mils of 0.5 per cent. of the powder (stroph. l.)
Time in seconds and base line
Respiratory tracing (stethogram)
1 minute
2'
3'
6'
7'
8'
9'
11'
13'
15'
18'
20'
24
28'
32'

②

PLATE 3.

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COMPLAINTS OF PATIENTS UNDER ANTILEPROSY TREATMENT, III

COMPARISON OF CREOSOTED AND NON-CREOSOTED CHAULMOOGRA ETHYL ESTER PREPARATIONS

By H. W. Wade

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TOPICAL SUMMARY

- Introduction.
    - Number of cases and distribution by preparation (Table 1).
- General Analysis.
    - Duration to complaints.
        - Distribution of cases by duration and total complaints (Table 2).
        - Complaint types to duration (Table 3).
    - Treatment methods used.
        - Dosages, numbers of injections, and total amounts of drug (Table 4).
        - Correlation of averages and relation of complaints to treatment factors.
- General Analysis—Continued.
    - Complaints recorded, by treating units (Table 5).
- Comparison of Preparations Used.
    - Treatment factors (Table 6).
    - Complaints.
        - Total complaints (Table 7).
        - Complaint types (Table 8).
    - Treatment factors to complaints.
        - Dosage (Table 9).
        - Numbers of injections (Table 10).
        - Total amounts of drugs (Table 11).
        - Type of complaint to total amount.
- Summary.
- Conclusions.

INTRODUCTION

In June, 1923, comparison having been made of 0.5 per cent and 2 per cent iodized chaulmoogra ethyl esters and the plain drug with respect to complaints of patients under treatment, it was decided that the first was the preparation of choice. However, preliminary observations made by Samson and Limkako,[2] of the Culion Leper Colony staff, on small groups of selected cases, with a view of determining the influence of the principal constituents of Muir's E. C. C. O. mixture (which contains chaulmoogra ethyl esters, creosote, camphor, and olive oil), had indicated that creosoted ethyl esters are better as regards improvement obtained than the preparations theretofore used. It was, therefore, decided to determine whether similar results would be obtained with this preparation when used on a large scale on the ordinary run of cases, and at the same time to determine the effect of a combination of iodine and creosote in ethyl esters.

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[1] This report is based on data obtained during the temporary service of the writer as acting chief physician of the Culion Leper Colony and, as such, chairman of the staff committee controlling the treatment work. Acknowledgment is made of indebtedness to the clinic physicians on whose records the analysis is based. Published with the consent of the Director of Health and the approval of the Philippine Leprosy Research Board.

[2] Philip. Journ. Sci. 23 (1923) 515–529.

The staff committee decided that, on account of the irritating character of the plain drug, which seriously limits the intensiveness of its use, it might well be discontinued, but that, if the treating physicians preferred to continue giving it to patients who were doing well under it or who preferred not to change, they might do so; that patients transferred from the plain drug should be given a preparation containing 10 per cent creosote, and that those who were at that time receiving the (0.5 per cent) iodized esters should be divided more or less evenly and one group be given a 0.5 per cent iodized 10 per cent creosoted preparation. This understanding was transmitted to the treating physicians, but no definite order was issued, for it was felt to be preferable, particularly since the creosoted preparations had not definitely been proven both superior and safe for all types of cases, to allow the treating physicians to use their own discretion in the selection of the preparation to be used in each case. It was considered unjustifiable arbitrarily to apply a given preparation to cases deemed by their physicians unsuitable. As a result of this the assignments were not made on a wholly impartial basis. It appears that some, fearing kidney irritation from the creosote, selected their cases on the basis of urinalyses but without selection otherwise. Some, it seems, tended to put under the new preparations cases that were stationary or becoming worse under the old. One or two admittedly gave the creosoted preparations to cases that showed evidence of pulmonary trouble, and others may have tended unconsciously to do this. In spite of this selection it is believed that, in the main, the results are not greatly affected except perhaps as regards respiratory-tract (type 4) symptoms, as will be pointed out.

Treatment with these new preparations was begun in July. Reports on the treatment factors and the complaints recorded were obtained for the months of September and October, thus allowing more than a month for the groups under the new treatments to arrive at an equilibrium in the matter of complaints.

It will be noted that there are differences between the frequencies of complaints here and in the previous analysis. This is probably for the most part due to the fact that several hundreds of cases had been dropped in the interim; these were considered unsuitable for continued antileprosy treatment on account of conditions such as pulmonary tuberculosis or nephritis, or because of their refusal to take treatment regularly. The complaints may also have been affected by climatic conditions. The first inquiry was made in the height of the dry season (April to June), during which the weather is hot, uniform, and trying, while the present one was made in the latter part of the rainy season, which is distinctly cooler and less uniform. This may be more stimulating;[3] at the same time, rains and cool nights are tying to the poorer, less well provided for colonists. Unfortunately, the two analyses do not afford a basis for determining the influence of season because of the differences in treatment and the dropping of the poorer cases.

The data obtained in the previous inquiry are published in two papers,[4] one dealing with general factors and the other with the comparison of the preparations then used. Though the present paper deals primarily with the comparison now under consideration, it will be necessary to include to some extent the same general considerations that were published in the first paper, but they will be treated more briefly.

To avoid frequent repetitions of the full designations of the preparations used, the symbols C. E., chaulmoogra ethyl esters (plain); C. E. Cr., chaulmoogra ethyl esters with 10 per cent creosote; C. E. I., ethyl esters with 0.5 per cent iodine; C. E. I. Cr., ethyl esters with iodine and creosote, are used in this paper.

NUMBER OF CASES AND DISTRIBUTION BY PREPARATION

A total of 2,214 cases is involved in the present analysis, this being the number reported on by the seven physicians of Clinics I and II who carried on routine treatment during the period under consideration, and including a small special group treated by the supervising physician of Clinic I which will usually not be considered in the analyses. The numbers of cases dealt with in the tabulations do not always agree with this total. In some instances this is due to deliberate omission of certain cases, in others to errors which are altogether too insignificant to justify the considerable labor of repeating the primary tabulations.

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[3] Huntington, E., Civilization and Climate, Yale University Press ed. 2 (1922).

[4] Philip. Journ. Sci. 25 (1924) 661 to 710.

The distribution of cases in treatment groups as reported by the individual physicians is shown in Table 1.

TABLE 1.—*Distribution of cases in treatment groups, by treating units.*

[Figures indicate percentages.]

Clinic.	Cases.	C. E.	C. E. Cr.		C. E. I.	C. E. I. Cr.
		Weekly (125 cases).	Weekly (273 cases).	Semiweekly (216 cases).	Weekly (583 cases).	Weekly (1,015 cases).
I, 1	296	----------	----------	16.7	8.2	75.0
I, 2	310	----------	----------	15.5	16.8	67.7
I, 3	256	----------	----------	26.8	73.2	----------
I, 4	330	----------	7.3	15.1	32.5	45.2
I, S. P.	47	----------	----------	----------	19.1	80.8
I, total	1,239	----------	1.9	17.5	30.8	49.9
II, 1	284	8.4	41.6	----------	10.6	39.5
II, 2	353	13.9	26.9	----------	19.3	40.0
II, 3	338	15.4	10.6	----------	31.1	42.9
II, total	975	13.8	25.5	----------	20.8	40.8
Grand total	2,214	5.6	12.3	9.8	26.3	45.9

Of the entire group, nearly one-half was given C. E. I. Cr. and about one-quarter C. E. I.; the other groups being smaller, the findings in them will perhaps be less reliable, though the smallest (C. E.) has 125 cases, which is not small as such work ordinarily goes.

It is noticeable that in Clinic I comparatively few cases were retained on non-iodized preparations and that the unmodified plain drug was abandoned entirely; most of the cases that had received it were given C. E. Cr. twice a week, as the plain drug had previously been given. One physician who was prejudiced against the combination of creosote and iodine preferred not to use it at all. In Clinic II the four preparations were used more or less extensively; of the totals receiving the non-iodized preparations (373 cases), and also those given the iodized ones (602 cases), two-thirds were put under the creosoted variety. However, the different groups are in the aggregate large enough for the comparisons to be of value. Though because of the different proportions in the units the total figures will not be the same as if all had distributed their cases uniformly, the difference is usually not important. The Clinic I figures, because of lack of any plain C. E. cases and because some of the C. E. Cr. cases were treated twice a week, are of value chiefly for comparison of the two iodized preparations.

GENERAL ANALYSIS

DURATION TO COMPLAINTS

It was supposed that duration of the disease, which on the average in a large group of cases determines the degree of advancement, would naturally be strongly reflected in the frequency and types of reactional incidents of which patients under treatment complain. The results obtained from the analysis show surprisingly little of such relationship.

DISTRIBUTION OF CASES BY DURATION, AND TOTAL COMPLAINTS

In Table 2 are shown (*a*), the distribution by duration, by clinics and in total; (*b*), the percentages of cases complaining; and (*c*), the excess complaint rates, which as before indicate the average number of complaints in excess of one per person complaining. The figures for duration, being based on the patients' statements, are doubtless very inaccurate and considerably too low; to what extent this fact affects the findings cannot be said, but it is probably not important. The absolute values of the figures on complaints, as in the previous inquiry, probably tend to be low, but their relative values are probably not greatly affected by the personal equation and are sufficiently dependable for the present purpose.

TABLE 2.—*Distribution of cases by duration, percentages complaining, and excess complaint rates.*

[Clinic I, 1,233 cases; Clinic II, 971 cases; total, 2,204 cases.]

Duration.	Distribution of cases (percentages).			Number complaining (percentages).			Complaint rates (excess rates).		
	Clinic I.	Clinic II.	Total.	Clinic I.	Clinic II.	Total.	Clinic I.	Clinic II.	Total
Years.									
To 2	4.5	3.8	4.2	44	78	59	0.71	0.90	0.80
2 to 4	16.6	12.1	14.6	56	79	64	0.92	1.14	1.02
4 to 6	22.8	14.6	19.2	54	68	59	0.56	1.02	0.74
6 to 8	17.5	17.7	17.6	55	78	65	0.81	1.02	0.92
8 to 10	15.2	14.9	15.1	48	80	62	0.78	0.92	0.86
10 to 15	16.8	25.6	20.6	55	73	65	0.59	1.04	0.86
Over 15	6.6	11.3	8.6	44	74	62	0.47	0.88	0.75
Average	------	------	------	53	75	63	0.71	1.00	0.86

Only 18.8 per cent of these cases claim duration of four years or less, and this proportion is undoubtedly high. Clinic I has a disproportion of early cases, 43.9 per cent up to six years

against 30.5 in Clinic II. The latter has many more above ten years, 36.9 as compared with 29.2 per cent. The approximate total average duration, estimated from the primary tabulation, is 8.3 years; that for Clinic I is 7.6 years and that for Clinic II 9.1 years.

If it be assumed that the average duration before apprehension is three years, and as shown by the colony death rate the expectancy of life at Culion is about eleven years, totaling fourteen years average total duration, the entire group has passed 59 per cent of this period. The Clinic I group is but 54 per cent advanced, the Clinic II group 65 per cent; the latter is 20 per cent more than the former, undoubtedly an important difference as regards prognosis.

The total percentage of patients complaining is 63, somewhat better than the 70 per cent of the previous inquiry. Clinic I now records as complaining but 53 per cent of its patients, against the previous 63 per cent, but Clinic II has decreased only from 79 to 75 per cent. The present figure is 41.4 per cent more than that of Clinic I, a difference twice as great as in duration. This might be explained on the ground that it is to be expected that complaints will be disproportionately more numerous in more-advanced cases, but this explanation is not borne out. No relation whatever is seen between the duration and the percentages of patients complaining. While the lowest figure of the total percentage column is in the first age group (due solely to the low Clinic I figure), that for the third group is nearly as low, and the others, which are fairly uniform, are not much higher. The frequency rates of the two clinics show as much difference as do the percentages. This factor does show a tendency to decrease with duration, but chiefly in Clinic I, and the total figures are somewhat irregular, the 6-to-8-year group having as low a rate as the total +15 group.

These unexpected findings negative the assumption that greater duration alone is responsible for the apparently less favorable character of the Clinic II cases, as indicated by their higher complaint figures and the fact that they have to drop cases more frequently. Nor does the assumption of some other inherent factor, as intercurrent affection, afford sufficient explanation of the higher complaint figures, for the first group and many of the second groups of this table are made up of new cases that have come to Culion since the work of this clinic started and are quite as favorable as those taken on in Clinic I during the same period. Either the somewhat more intensive treatment given by the Clinic II physicians is responsible, which may be controverted though not disproved by some of the data herein, or these physicians have on the whole paid more attention to recording.

COMPLAINT TYPES TO DURATION

Though the total complaint figures show no important variation with duration, the individual types of complaints do show some such relation. In Table 3 are given the percentages of patients complaining of each type, without regard to the numbers of complaints or of symptoms of a type; for example, a patient might have complained once of induration (type 2), and twice of cough and once of chest pain (type 4), but only two type complaints would be credited here. The excess frequency rates have also been worked out, but they are for the most part not essentially different. Figures for each clinic have been determined, but are not given, though they will be referred to.

TABLE 3.—*Relation of numbers of patients having type complaints to duration.*

[Figures indicate percentages.]

Duration.	Total number in group.	Type of complaint.				
		1	2	3	4	5
Years.						
To 2	92	8.7	11.9	25.0	27.2	17.4
2 to 4	322	7.8	14.6	20.8	23.6	23.0
4 to 6	423	2.8	11.3	20.6	27.9	18.0
6 to 8	388	8.5	7.8	23.7	29.2	21.6
8 to 10	333	8.4	6.3	23.7	32.8	19.5
10 to 15	455	8.6	10.3	22.0	30.6	21.8
15 to 20	140	10.0	5.7	18.6	31.4	15.0
Over 20	51	11.8	3.9	23.6	29.4	11.8
Total	2,204	7.5	10.0	21.5	28.8	20.0

Type 1.—Cases of longer duration would from the total figure seem more prone to this type, but this is not borne out by the clinic figures. As in the previous inquiry, Clinic II reports far more of this type. This, together with the difference of duration distribution, makes the apparent upward trend of the total figures. Clinic cases predominate in the low-duration groups, reducing the total, and Clinic II at the other end, tilting the figures upward. This unbalancing is seen in other connections, but not to the same extent. The frequency rates tend to decrease somewhat with increased duration.

Type 2.—Here is an unquestionable decrease with increase of duration, also found in the frequency rates. The first three groups (to six years) average 12.7 per cent complaining against 7.9 per cent for the balance.

Type 3.—There is in the total figures no distinct tendency to change, and averages for the three groups to six years and for the balance are very similar, 21.2 to 22.6. However, in Clinic II there is a slight tendency to decrease. The rates are also uniform for the total group, but even more different in the clinics than are the percentages increasing in Clinic I and decreasing in Clinic II.

Type 4.—Here is slight increase in the older groups, more apparent in the figures of Clinic II than in those of Clinic I. The first three groups of the totals average 26.1, the balance 30.7. The rates increase somewhat more markedly.

Type 5.—No very distinct difference is seen except in the last two groups, which decrease. The first three groups total 19.8, the next three 21.1, an insignificant difference, the last two but 14.1. The rates also decrease—as with the percentages, most markedly in Clinic I. These very old cases are, in the main, probably not active and, therefore, not so liable to the lepra reaction as the earlier ones.

To summarize, it is seen that the percentages of patients complaining and the total complaint rates (Table 2) do not vary with duration, but that there are variations in the types. With types 1 and 3 no regular or definite shift is seen; that the latter does not increase decidedly with duration is surprising. Type 2 decreases decidedly, perhaps because the patients have been treated longer and are more accustomed to it, or because they are really less susceptible. Type 4 increases with duration, as is to be expected. Type 5 decreases somewhat, though not markedly, in the groups of longest duration, well above the usual expectation of life of a leper; obviously, the disease is relatively or absolutely inactive in these.

On comparing the rates here found with those of the first inquiry[5] it is seen that there are slight increases in types 1 and 4 (from 7.1 to 8.6 and from 41 to 43, respectively). The improvement as regards the latter that would perhaps have been obtained had the 0.5 per cent iodized drug been used entirely has not been realized with the preparations used. Type 2 is much lower (14 as compared with 34), type 5 somewhat increased, but not to an important degree (25 as compared with 22), and type 3 is nearly the same (26 against 24). From this it seems probable that the present observation is causing little if any ill effect, whatever the therapeutic result may be.

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[5] Philip. Journ. Sci. 25 (1924) Table 4, page 676.

TREATMENT METHODS USED

The treatment methods of various physicians will be considered briefly, both for purposes of orientation and for comparison with the previous findings. In Table 4 are given in condensed form the percentages of the patients of each treating unit that were given various doses, numbers of injections, and consequent total amounts of drug. The averages are given in the last section of the table. The dosage averages are based on all treatment groups, but those for numbers of injections and total amount of the Clinic I units do not include the C. E. Cr. groups, since these were treated twice a week. The Clinic II figures are for all four treatments, which undoubtedly tends to lower them slightly (see Table 6),. making the Clinic I figures relatively somewhat too high.

The three divisions in each section represent, roughly, low, medium, and satisfactorily high. With dosage, "1 or 2" actually means any average dose up to 2.5 cubic centimeters, and "3 or 4" from 2.6 to 4.5. In the headings of the second and third sections the numbers in parentheses refer to the numbers of injections or total amount given the twice-a-week group, which are included in these tabulations.

TABLE 4.—*Dosages, numbers of injections, total amount given by each treating unit, and averages.*

Treating unit.	Number.	Dose (percentages).			Number of injections (percentages).			Total amount (percentages).			Averages.		
		1 or 2.	3 or 4.	5 or 6.	1-3 (1-6).	4-6 (7-12).	7-9 (13-17).	0-15 (0-20).	16-30 (21-40).	-30 (-40).	Dose.	Number of injections.	Total amount.
I, 1	296	0.7	70	29	6.1	34	60	6.1	38	56	4.2	6.7	29.6
I, 2	310	5.5	72	22	9.4	39	51	16	50	35	3.9	6.4	26.3
I, 3	256	5.9	94	0	8.2	38	54	14	56	30	3.5	6.7	25.4
I, 4	330	46	45	10	5.2	36	58	33	51	15	2.8	6.5	20.6
I, S. P.	47	64	34	2.1	23	32	45	66	26	8.5	2.4	-----	-------
Total	1,239	17	67	15	7.7	37	55	20	48	33	3.5	6.6	25.2
II, 1	284	7.1	28	65	10	45	45	15	33	52	4.6	6.2	31.4
II, 2	353	5.4	79	15	6.8	31	63	15	46	38	3.8	6.6	26.6
II, 3	338	1.8	46	53	11	43	46	15	38	48	4.5	6.1	30.2
Total	975	4.6	53	43	9.2	39	52	15	39	46	4.3	6.4	29
Grand total	2,214	12	61	27	8.4	38	54	17	44	38	-----	-----	-------

DOSAGES, NUMBERS OF INJECTIONS, AND TOTAL AMOUNTS OF DRUG

Dosage.—As in the previous inquiry, the Clinic I physicians are the more conservative, only one having given an average dose of over 4 cubic centimeters, while two of the three in Clinic II attained 4.5 cubic centimeters. The clinic averages, 3.5 and 4.3 cubic centimeters, respectively, are decidedly different. Units I, 3 and I, 4 gave peculiar dosages, as before. In no case did the former average more than 4.5 cubic centimeters during the period, and barely 6 per cent received less than 2.6. The latter unit has the remarkably high figure of 45 per cent receiving less than 2.6 cubic centimeters per injection. The I, S. P. figure is not comparable. In Clinic II one physician averaged over 4.5 cubic centimeters in practically two-thirds of his cases and another in 52 per cent, both giving over 5.5 cubic centimeters to more than 30 per cent. However, it must be said that more recently there has been a tendency in this clinic to adopt 5 cubic centimeters as a maximum. That the high complaint figures of this clinic are due to these doses seems improbable; Units I, 1 and I, 2 gave as high as did II, 2, but had fewer complaints.

Numbers of injections.—From the column of averages it is seen that the numbers of injections are on the whole high, always averaging more than 6 out of a possible 8 or 9 in spite of the fact that few if any interpolated extra injections were given. Differences between the units of Clinic I are less than between those in Clinic II, the averages for which are lower, perhaps in part because of the high dosage and partly due to the inclusion of the C. E. cases in estimating their averages. Further discussion of the detailed figures is unnecessary; the main features can readily be seen by inspection of the table.

Total amounts.—Clinic II units gave considerably the larger amounts. There is remarkable uniformity in the low-group figures of this clinic. In Units II, 1 and II, 3 the numbers given over 45 cubic centimeters were 21 and 17 per cent, respectively, an excellent showing. These large amounts were not, as in the first inquiry, attained by giving extra injections. Neither Unit I, 3 nor I, 4 gave any case more than 45 cubic centimeters; the latter had more than twice as many in the first, perhaps ineffectual, division than any other unit.

CORRELATION OF AVERAGES AND RELATION OF COMPLAINTS TO TREATMENT FACTORS

Correlation of averages.—When the averages are considered in relation to each other it is noted that, because of greater uniformity of numbers of injections, the differences in the total amount given are chiefly due to dosage. It is noteworthy that low dosage results in low total amounts, not being compensated by more injections. This may be because patients, even though not ailing, cannot be expected in a large colony to appear for treatment with regularity.

Relation of complaints to treatment factors.—If the tendency of some units to give comparatively small total amounts were to be criticized, it might be held that this is justified. It might be assumed that, in spite of the apparent direct relation of improvement to amount of drug given, more or less frequent omissions of treatment, giving the patients occasional rests, will less frequently give rise to complaints or (and more especially) that lower dosage might do so and thus be beneficial. To determine whether the reports give evidence of such effect, the figures on complaints have been studied in this relation. They will not be presented. Suffice it to say that, as in the first inquiry, nothing conclusive has been found. For example, in one clinic the unit reporting fewest patients complaining had given the largest amount, whereas in the unit giving decidedly the least amount the number complaining was the same as the whole clinic average.

When the present figures on treatment factors are compared with those of the previous inquiry decided differences are seen. Dosage[6] has been increased from the unsatisfactory 2.7 cubic centimeters, for the iodized preparations only, to 3.9 cubic centimeters for all preparations here used. The numbers of injections have also increased, from 6 for those previously treated without interpolated injections to 6.5. The total amounts have increased very satisfactorily, from 16.7 cubic centimeters to about 27.6 cubic centimeters. Though this is no doubt due in part to elimination of unsatisfactory cases, and perhaps to different climatic conditions, it is in greater part due to the less-irritating character of the preparations used and deliberate efforts to intensify the treatment.

COMPLAINTS RECORDED, BY TREATING UNITS

Before analyzing the complaint data it is necessary, because of the wide differences found in the complaint figures of the two clinics, to examine the records of the individual treating units from this viewpoint. In Table 5 are given, for each of these, the percentages complaining and the total rates of all complaints together and of each type. It is of interest to compare the figures here with the corresponding ones in Table 8 of the first paper. The comparison emphasizes the variability of the personal equation, and the necessity of examining the data from various angles before arriving at any conclusion.

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[6] Philip. Journ. Sci. 25 (1924) Table 7, page 682.

TABLE 5.—*Complaints recorded by treating units.*

[Total complaint rates, per 100 patients treated.]

Treating unit.	Cases.	Cases complaining.	Complaint rate.	Complaint-type rates.				
				1	2	3	4	5
		Per cent.						
I, 1	296	48	84	0.7	0.7	21	36	28
I, 2	310	50	74	3.2	9.4	15	18	15
I, 3	256	54	96	1.6	2.7	13	22	30
I, 4	330	50	81	2.7	21	16	6.4	16
Total	1,197	50	83	2.1	9.0	16	20	17
II, 1	284	74	154	15	14	27	74	25
II, 2	353	70	154	15	13	29	68	29
II, 3	338	80	146	20	17	35	52	22
Total	975	75	152	17	15	31	64	26

So far as percentages complaining are concerned there is close agreement between the units of Clinic I, and fairly close agreement between those of Clinic II; but between the two clinics, with 50 and 75 per cent, respectively, there is a wide gulf.

In the complaint rates, however, the Clinic I units disagree widely. The differences between 74 and 96 for the total complaints, and between 0.7 and 3.2 for type 1, 0.7 and 21 for type 2, and 6.4 and 36 for type 4 would be difficult indeed to correlate with any legitimate factor discoverable.

The Clinic II figures, in marked contrast, not only agree fairly well in the percentages, but they agree remarkably well in the rates for total complaints and in those for each type. It would seem, from comparison with Table 8 of the first paper, that recording in this clinic has improved markedly. Because of this satisfactory finding greater weight must be placed on the Clinic II figures in the comparison of the preparations used.

COMPARISON OF PREPARATIONS USED

The preceding section of this paper has dealt entirely with general factors; the remainder will be devoted to the comparison of the four preparations used.

TREATMENT FACTORS

The data on the intensiveness of treatment given with the different preparations is presented in condensed form in Table 6. It is to be remembered that only in Clinic II were all four preparations used on a basis at all comparable. For this reason the Clinic II figures on C. E. I. and C. E. I. Cr. are so placed as to be readily compared with the others. The Clinic I figures on the latter two are not only quantitatively but also comparatively different from those of Clinic II.

The plain and simple iodized preparations having been compared already, interest lies mainly in the comparison of the simple creosoted with the plain, and of the two iodized preparations.

TABLE 6.—*Comparison of the preparations used as regards dosage, numbers of injections, and total amounts given.*

Preparations.	Cases.	Dosage (percentages).			Number of injections (percentages).		
		1 or 2 (cc.).	3 or 4 (cc.).	5 or 6 (cc.).	1–3 (1–6).	4–6 (7–12).	7–9 (13–17).
C. E.	129	3.9	68	28	17	45	48
C. E. Cr. (1x)	249	6	56	38	6.8	38	55
C. E. I. (Clinic II)	203	3	47	54	11	34	55
C. E. Cr. (Clinic II)	398	4.8	50	45	7.5	40	52
C. E. Cr. (2x)	213	25	60	15	14	44	42
C. E. I. (Clinic I)	382	16	76	8.6	5	33	62
C. E. I. Cr. (Clinic I)	612	14	67	19	6.8	36	57
C. E. I. (total)	585	11	64	24	7	33	60
C. E. I. Cr. (total)	1,010	10	60	30	7.1	38	55

Preparations.	Total amount (percentages).			Averages.		
	10–15 (0–20).	15–30 (20–40).	30–45 (40–60).	Dose.	Number of injections.	Total amount.
						cc.
C. E.	23	47	30	4.02	5.8	23.8
C. E. Cr. (1x)	14	40	46	4.15	6.4	29.1
C. E. I. (Clinic II)	16	35	49	4.51	6.3	31.8
C. E. Cr. (Clinic II)	12	40	48	4.33	6.4	29.5
C. E. Cr. (twice a week)	18	45	37	3.24	10.7	36.9
C. E. I. (Clinic I)	17	52	31	3.46	6.8	24.7
C. E. I. Cr. (Clinic I)	17	48	35	3.71	6.4	25.3
C. E. I. (total)	16	44	38	3.84	6.6	27.2
C. E. I. Cr. (total)	15	45	40	3.93	6.4	27.1

Dosage.—In Clinic II all averages are above 4 cubic centimeters. The plain drug was given in somewhat the smallest dose. C. E. Cr. has considerably more cases in the third (high) group. C. E. I. Cr. is still better, and the simple iodized is best. In Clinic I, however, where comparatively many were given small, perhaps ineffective doses and the averages were all below 4 cubic centimeters, the advantage is reversed, the C. E. I. dose being enough lower than the C. E. I. Cr. to give the latter the advantage in the total figures. These totals cannot be compared directly with the C. E. and C. E. Cr. figures. The twice-a-week (C. E. Cr.) group received the smallest dose of all, as in the previous inquiry. It can at least be concluded that addition of creosote did not necessitate any reduction of dosage, but that, on the contrary, it tends to reduce the irritation of the plain drug.

Numbers of injections.—In Clinic II there is no noteworthy difference except for the plain drug, which was given least frequently. In Clinic I, where C. E. I. Cr. was given in larger doses than C. E. I., it was given fewer times. The clinic figures for the former preparation are, for once, in agreement. It is of interest that C. E. Cr. was given as frequently as was C. E. I. Cr. and, in the same clinic, as C. E. I., which had previously been found superior even to 2 per cent iodized.

The combination of creosote and iodine is neither more nor less favorable than the simple creosoted in this respect, by the testimony of both clinics, and only slightly less favorable than the simple iodized in the total figure.

Total amount.—This is, according to the preliminary findings of the results of the antileprosy treatment work at Culion, the important factor in determining improvement in suitable cases. The variations seen here are obviously due for the most part to differences in dosage. Because of the lower dosage in Clinic I, the Clinic II figures are of more interest in this connection. The low figure of that clinic for the plain drug is striking. That for C. E. Cr. is much better, 22 per cent more of the drug having been given, and that of C. E. I. Cr. is somewhat more so. The simple iodized has the best figure, 9.3 per cent more than C. E. Cr., and 7.7 per cent more than C. E. I. Cr.; the importance of this will depend on the complaint figures, to be seen, and the therapeutic effects. Clinic I gave its twice-a-week group under C. E. Cr. but 27 per cent more of this preparation than did Clinic II on the once-a-week basis, but the difference between this and the other Clinic I figures would seem to justify the extra labor involved.

COMPLAINTS

Simple figures on the intensiveness of treatment given over a short time when a new medicament is first used will not suffice to afford dependable indication of the usefulness of such medicament. The complaints produced must also be taken into account as furnishing an indication of whether or not it can be used over a long period of time. The balance of this paper is devoted to the analysis of the complaints reported in relation with the preparation.

TOTAL COMPLAINTS

The percentages of patients in each treatment group for whom some complaint was reported, and the excess rates for these, are given in Table 7.

TABLE 7.—*Total complaints, by preparation.*

Preparation.	Cases.	Patients complaining.	Complaint rates.	
			Excess.	**Total.**
		Per cent.		
C. E.	129	75	1.30	173
C. E. Cr. (1x)	249	71	0.95	138
C. E. I. (Clinic II)	203	68	0.95	132
C. E. I. Cr. (Clinic II)	398	80	1.00	159
C. E. Cr. (2x)	213	61	1.03	124
C. E. I. (Clinic I)	382	53	0.63	86
C. E. I. Cr. (Clinic I)	612	50	0.63	82
C. E. I. (total)	585	57	0.76	100
C. E. I. Cr. (total)	1,010	61	0.82	112

That the percentage complaining under C. E. is but slightly higher than that under C. E. Cr. is undoubtedly due to its less intensive use; in spite of this, the frequency rate in those complaining is the highest of the lot. It is evident that the addition of creosote to the ethyl esters reduces irritation.

In the same clinic C. E. I. has nearly the same percentage complaining as C. E. Cr., and these have exactly the same excess complaint rates. In view of the treatment factors, the simple iodized has a distinct though perhaps not important advantage here. C. E. I. Cr. has distinctly higher figures, summarized in the total complaint rate, the difference being more marked on considering its lower treatment factors. The figures of Clinic I are not in agreement with those of Clinic II, giving a somewhat lower percentage complaining under the C. E. I. Cr. in spite of slightly more intensive use of it. Though the difference does not reverse the positions of the two in the totals, the lack of agreement in the findings makes the apparent disadvantage of C. E. I. Cr. less certain, or at least less marked. However, its continued use would not seem justified unless it should show better therapeutic effect than the other preparations—something which it is not expected it will do.

The twice-a-week C. E. Cr. group of Clinic I has much higher figures than the other groups of that clinic, the total rate being practically 50 per cent higher; even so, the Clinic II figures are not attained.

COMPLAINT TYPES

The total number of complaints caused by a drug is less important than the kinds of complaints; of two preparations the one with the higher total figure might, if due to, say, local irritation, be preferable to one with the lower figure if it caused more respiratory-tract disturbance. In Table 8 are figures bearing on this point.

The figures in Table 8 and in the tables to follow have been derived in a manner different from those heretofore given. The actual figures obtained directly from a tabulation are more or less modified, in their absolute if not their relative value, by the peculiarities of the physicians' reports unless each physician reports on an equal number of cases. If one physician reports a higher rate on, say, type 1 for a given preparation but he treats only a few cases with it, while another has a low rate and his group is large, the influence of the first physician's rate on the total will be proportionately diminished. The figures given in Table 8 are total rates derived by averaging the rates directly obtained from each physician's figures on each preparation that he used; this procedure eliminates the factor of irregularity of distribution. Some of the figures thus obtained differ distinctly in absolute value from those gotten directly, but the comparisons are not essentially affected.

TABLE 8.—*Total rates of each type of complaint, estimated on the basis of equal numbers of cases treated with each preparation by each physician.*

Preparation.	Cases.	Complaint type.				
		1	2	3	4	5
C. E.	129	2.7	69	33	46	23
C. E. Cr.	249	19	4.8	27	70	26
C. E. I. (Clinic I)	382	3.2	7.3	21	20	24
C. E. I. (Clinic II)	203	9.3	10	30	51	27
C. E. I. (total)	585	5.8	8.7	25	33	25
C. E. I. Cr. (Clinic I)	612	2.6	15	20	26	17
C. E. I. Cr. (Clinic II)	398	23	7.6	31	72	25
C. E. I. Cr. (total)	1,010	13	11	26	49	21

In regard to type 1, the Clinic II rate for C. E. is strikingly less than that for C. E. I.; the latter was found the most productive of this type in the first inquiry, but the present difference is greater, perhaps because the cases now treated with C. E. are selected. The creosoted preparations have surprisingly high rates in Clinic II. On the other hand, Clinic I has very low rates with little difference between the preparations. No explanation can be offered for this striking disagreement.

Type 4 is to be correlated with this type. The C. E. I. rate for this is somewhat higher than the rate of C. E., and the C. E. Cr. and C. E. I. Cr. rates, nearly alike, are much higher than the C. E. I. rate. Here again Clinic I is very low. The total high figures for the creosoted preparations cannot be accepted without question. This is not only because Clinic I gives less difference than Clinic II, but because, unfortunately, certain of the Clinic II physicians selected cases with respiratory-tract disease for the creosoted groups.

Type 2 complaints are surprisingly low except with the plain drug, thus emphasizing the reduction of local irritation by both adjuvants. C. E. Cr. would therefore seem to be even less irritating than C. E. I. Comparing C. E. I. and C. E. I. Cr., the clinic figures are at variance, but on the whole there is no important difference. Type 3 is, as in the previous inquiry, very uniform; even the usual clinic differences are almost overcome. Type 5 figures are also surprisingly similar in these corrected figures.

Therefore, except for the perhaps questionable rates for types 1 and 4, there is little difference as regards complaint types between the three medicated preparations.

TREATMENT FACTORS TO COMPLAINTS

The variation of the complaints in patients under the various preparations with variation of treatment factors remains to be considered. Recognizing that, because of clinical control, the most numerous complaints should be found in those receiving least treatment, nevertheless, to obtain definite therapeutic effect the treatment must be pushed in suitable cases in spite of incidental complaints. It is important to determine a therapeutically effective medicament which can be so pushed with a minimum of such disturbances.

These factors have been examined with relation to the percentages of patients complaining and the excess complaint rates in these, but for present purposes it will suffice to present the total rates, which combine these two factors. To avoid too great subdivision of the cases, which leads to irregularity of the resulting figures, the C. E. I. and C. E. I. Cr. groups of both clinics are combined; the differences in clinic figures will of course lower the figures obtained, but will not affect this analysis.

DOSAGE

The rates for the various doses are given in Table 9. Here certain figures, based on less than ten cases, are inclosed in double parentheses, and others, based on ten or more but less than twenty, in single parentheses, to indicate that they may be correspondingly more inaccurate than those based on larger groups.

TABLE 9.—*Dosage to complaints, by preparations (estimated).*

[Total rates, per 100 cases in each group.]

Dose.	C. E.	C. E. Cr.		C. E. I.	C. E. I. Cr.
	Weekly.	Weekly.	Semi-weekly.		
cc.					
1	((100))	(220)	((267))	(119)	(110)
2	((100))	132	150	94	119
3	189	167	113	144	121
4	176	125	112	90	105
5	187	160	86	88	101
+5	(133)	114	((80))	77	132

With C. E. the rates are, on the whole, sustained, and of course higher than those of the comparable C. E. Cr. group. With the latter there is a decrease. In the twice-a-week group this is decidedly more marked and regular. C. E. I. has a peculiarly high point at 3 cubic centimeters, but elsewhere shows but a moderate decrease. C. E. I. Cr. decreases somewhat, but has its highest figure in the +5 cubic centimeter group; apparently it cannot be pushed as much as the others without causing trouble. There is an indication of this in the 5 cubic centimeter group under C. E. Cr. (once a week).

NUMBERS OF INJECTIONS

The relation of this factor to the total complaint rates is shown in Table 10. The numbers of injections in parentheses refer to the twice-a-week C. E. Cr. group.

TABLE 10.—*Numbers of injections to complaints, by preparations (estimated).*

[Total rates, per 100 cases in each group.]

Injections.	C. E.	C. E. Cr.		C. E. I.	C. E. I. Cr.
	Weekly.	Weekly.	Semi-weekly.	Weekly.	Weekly.
1-2 (1-4)	((200))	(173)	(164)	167	183
3-4 (5-8)	256	209	141	189	179
5-6 (9-12)	202	170	139	147	140
7-8 (13-16)	120	124	103	78	87
9 (17)	(36)	45	(50)	22	39

Though the rates for C. E. are the highest of all in the lower groups, in the groups given nearly the full number of injections they are not higher than those for C. E. Cr. In view of the different basis of selection of these two groups, and the lower rates of the first three groups of C. E. Cr., signifying that in those cases in which complaints caused the numbers of injections to be reduced, these complaints were less numerous, the latter drug has a slight advantage here. The selected C. E. Cr. twice-a-week group has apparently very satisfactory rates, but this is so because of the general level of Clinic I figures (cf. Table 11). Of the two iodized groups neither has a distinct advantage.

TOTAL AMOUNTS OF DRUGS

The total amount figures are shown in Table 11, in 15 cubic centimeter subdivisions except for the C. E. Cr. twice-a-week group, the amounts for which are shown in parentheses. The figures for C. E. I. and C. E. I. Cr. are given here by clinics as well as in total.

TABLE 11.—*Total amounts of drug given to complaints.*

[Rates per 100 cases treated.]

Total amount.	C. E.	C. E. Cr.		C. E. I.			C. E. I. Cr.		
	II	I	II	I	II	Total.	I	II	Total.
0–15 cc. (0–20)[a]	231	169	154	140	209	164	123	204	150
16–30 cc. (21–40)[a]	183	140	184	102	173	121	96	187	129
31–45 cc. (41–60)[a]	112	89	105	34	94	54	36	133	78
+45 cc. (+60)[a]	((67))	44	88	(17)	59	51	((43))	98	90

[a] Amounts in parentheses refer to the C. E. Cr. group only, injected twice a week.

From this aspect C. E. Cr. (Clinic II) has little advantage over the plain drug except in the lowest-amount group, where there is a marked difference. In the same clinic C. E. I. has much the best rates except in the 0 to 15-cubic centimeter group. Those of C. E. I. Cr. are not so good as those of C. E. Cr. and, starting from the same level as C. E. I., they decrease much less. In Clinic I, however, there is little choice between them, each having an advantage at one end of the column.

Therefore, as regards ability to push medication with the fewest complaints in the patients given the larger amounts as well as in those in whom treatment is limited on account of complaints, C. E. is decidedly the poorest. C. E. I. would seem on the whole, though not markedly, better than C. E. Cr., and C. E. I. Cr. is apparently distinctly less favorable than C. E. Cr.

TYPE OF COMPLAINT TO TOTAL AMOUNT

The question of whether any particular type of complaint increases or decreases in different degree from the others with increase of amount of the various preparations used has also been investigated. The findings are not of sufficient significance to justify presentation in detail. Briefly, with the creosoted preparations type 1 tends to be higher in the groups receiving the largest amounts than in those receiving less, while with the other preparations there is a decrease. Type 4 rates decrease in all, though with the creosoted somewhat less markedly than with C. E. I.; but that the rates decrease fairly well suggests that these preparations are not so irritating to the respiratory tract as other figures would seem to indicate. With type 2 the iodized decrease more in Clinic I than in Clinic II, whereas C. E. Cr. increases slightly. With type 3 C. E. Cr. has somewhat the best figures. With type 5 C. E. I. has the highest, the others being fairly similar. If these reactions are not desirable, this is a disadvantage for the simple iodized.

SUMMARY

Preliminary observations with creosoted chaulmoogra ethyl esters having indicated their superiority over the preparations theretofore used as regards therapeutic effect, they were applied extensively in July, 1923. The present report deals with the complaints recorded during September and October for the patients treated with (*a*), the plain, unmodified drug; (*b*), 0.5 per cent iodized, which had been found to be the preparation of choice in the inquiry dealt with in the first two papers of the present series; (*c*), 10 per cent creosoted ethyl esters; and (*d*), 0.5 per cent iodized 10 per cent creosoted preparation.

The cases dealt with total 2,214, several hundreds considered unsuitable for antileprosy treatment having been dropped since the previous inquiry. The basis on which the several preparations were applied is discussed, and the distribution actually made is shown in Table 1. Though this was irregular, all groups are large enough to afford statistics of value. Only the Clinic II figures afford a basis for comparison of all four preparations.

Though the previous inquiry was on complaints recorded during the hottest part of the dry season, and the present one on those recorded during the less trying part of the rainy season, the data afford no basis for determining the effects of the climatic factor on the intensiveness of treatment possible or on complaints, because of differences in medicaments and the elimination of unsuitable cases.

Analysis is made of the relation of duration of disease to complaints, the accuracy of which may be lessened somewhat by inaccuracy of the patients' statements. The distribution is shown in Table 2. In spite of probable understatement, the average obtained is about 8.3 years. Less than 20 per cent claimed duration of four years or less, and over 60 per cent admitted more than six years. This is not favorable from the viewpoint of prognosis. Clinic I cases are decidedly the earlier, averaging 7.6 years against 9.1 years in Clinic II. The difference is practically 20 per cent of a suggested average of fourteen years total duration of the disease in untreated cases.

Surprisingly, the figures show no relation between duration and numbers of patients complaining, and little with the numbers of complaints. The differences between the clinic figures are greater than in duration, and can hardly be ascribed to this factor alone. There is more relation between types of complaints and duration (Table 3). Apparently, type 4 is more frequent in the older cases, and types 2 and 5 are less frequent; these differences tend to neutralize each other in the totals.

The practices of the treating physicians as regards dosage, numbers of injections, and consequent total amounts of drug given are examined into (Table 4). Clinic I is still conservative as to dosage, giving decidedly less than Clinic II, in spite of which the numbers of injections are but little higher. This lack of compensation indicates that, in order to give as much medicine as possible, it is better, so far as possible, to give more when the patient is at hand than to depend on regularity of his appearance, at least in a colony such as Culion.

The comparison of figures on dosage with the complaints reported by the physicians concerned (Table 5) is unsatisfactory, as in the previous inquiry. The personal equation in recording is evidently great. The natural expectation that habitual lower dosage of a group of patients would result in fewer complaints is not borne out by the figures. On comparing this table with the previous findings it is found that the Clinic II figures are much more uniform than in the previous inquiry.

The four preparations used are compared as to dosage, numbers of injections, and total amounts given (Table 6). C. E., as expected, has the lowest total-amount figures. Though given in practically the same average dose as C. E. Cr., it was injected fewer times, though the cases were selected. Addition of creosote seems to permit more intensive medication, though not to quite the same degree as 0.5 per cent iodine. Comparison of the two iodized preparations is made uncertain by contradictory differences in the two clinics. C. E. I. Cr. has the advantage in Clinic I; C. E. I., in Clinic II; but the total figures for amount of drug given are practically identical.

On comparing the total-complaint figures of the preparations used (Table 7) it is found that, though C. E. does not have the highest percentage complaining, perhaps because controlled by the fewer injections and because of selection of the cases, nevertheless, it does have the highest complaint rates. C. E. Cr., with more drug given, has lower figures. These, however, are not so good as those for C. E. I. in the same clinic, particularly in view of the somewhat more intensive treatment with the latter. C. E. I. Cr. would seem to fall between C. E. and C. E. Cr., having more complaints than the latter. This difference is not seen in the Clinic I figures, where the two iodized preparations have nearly equal rates. However, it may be concluded that creosote added to the plain drug is almost, though not quite, as effective as 0.5 per cent iodine in reducing complaints (an unexpected finding), but that its combination with iodine is not quite so good. As the differences are not very great, the decision as to which preparation should be used must depend on the therapeutic effects, which are not yet determined.

The variations of frequency of the different complaint types under different preparations are shown in Table 8. Instead of rates being obtained directly, estimated or corrected rates are given, average percentages being based on equal numbers of cases under each preparation in the hands of each physician. In the Clinic II figures type 2 is less frequent with both creosoted preparations than with the simple iodized. Types 3 and 5 are much alike in all preparations. On the other hand, the creosoted preparations appear to have a decided disadvantage as regards type 1 and type 4 symptoms. This is important, if the fact, but it seems that some of the physicians selected cases with pulmonary trouble for these drug groups. The matter cannot be settled from present data.

The relationship of each treatment factor and frequency of complaints under each preparation was investigated. There is, on the whole, surprisingly little variation with dosage (Table 9). It was expected that, as in the previous inquiry, those given low dosage would have higher complaint rates, which would explain why these smaller doses were used. C. E. I. has more of a decrease with increased dosage than the others have. With increasing numbers of injections, however (Table 10), the rates decrease rapidly, as would be expected. C. E. I. rates are slightly better than C. E. I. Cr. Both seem decidedly better than C. E. Cr., but this is influenced to some extent by the inclusion of the lower Clinic I figures. With total amount (Table 11) the rates drop, those for C. E. I. most markedly. C. E. Cr. is somewhat better than C. E. I. Cr.

The relation of type of complaint to the average total amounts of drugs given has been investigated. The principal finding is that, with the creosoted preparations, types 1 and 4 show least of the natural tendency to decrease in the groups given most medication.

The comparison of the general data here seen with those of the first inquiry need not be discussed in detail. The frequencies of the different types of complaint are different, and there is an improvement in uniformity of recording, at least in Clinic II. The main point of interest is a decided increase in intensiveness of treatment, chiefly in the size of the dose, in spite of which there is a moderate decrease in complaints, probably determined by elimination of many unsuitable cases, decreased use of the plain drug and, perhaps, the season.

Considering the various factors, it is evident that even in selected cases the plain drug is the least desirable of the preparations used. From the present viewpoint alone simple iodized (0.5 per cent) is on the whole the best, since it is evidently possible to use it somewhat more intensively than C. E. Cr. with less complaining. The double-medicated preparation has little in its favor and may probably be discontinued unless, of course, it is found therapeutically superior, which is not expected.

The difference between C. E. I. and C. E. Cr. is not great enough to justify a decision on the basis of the factors here examined alone; it will depend on therapeutic results obtained, provided, however, that the indication here seen of respiratory-tract irritation does not prove cumulative. Even should this be seen, it would not indicate the entire abandonment of creosote, for it might be used in selected cases to advantage; or it might be well to reduce the concentration, though this is not so simple a matter as with iodine. The function of the latter is solely to reduce irritation, whereas creosote is used for its supposed therapeutic effect, and if it really has any this might be reduced by decreasing the concentration. In this connection it is of interest that Muir, whose E. C. C. O.[7] contained over 20 per cent of creosote, is now using[8] a 4 per cent solution of creosote in ethyl esters.

CONCLUSIONS

Duration of the disease, which averages 8.3 years in the cases under treatment, seems to have little influence on the total incidence of complaints in lepers under treatment, though certain types of complaints tend to increase and others to decrease.

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[7] Muir, E., Handbook on Leprosy, Cattack (1921) 43.

[8] Muir, E., Indian Journ. Med. Res. (1923).

There is indication that, in the interest of intensive treatment, it is better to give higher dosage than to depend upon regular injections, at least in a large colony.

Plain chaulmoogra ethyl esters are again shown to be decidedly the least favorable of the preparations used as regards treatment factors, frequency of total complaints, and most of the complaint types.

The addition of creosote (10 per cent has been used here) to plain chaulmoogra ethyl esters reduces the local irritation to almost, though not quite, the same degree as does 0.5 per cent iodine, and permits increased medication.

The simple iodized drug is somewhat, though not markedly, better than the simple creosoted as regards amount of medication and frequencies of complaints. Which is to be preferred will depend on a comparison of the therapeutic effects.

The combination of creosote and iodine has no distinct advantage and has certain disadvantages because of which its use is not justified unless it has an unexpected therapeutic superiority.

The only noteworthy drawback for the creosoted preparations is an apparently greater tendency to cause respiratory-tract irritation. However, this indication may be due to a possible selection of cases showing evidence of pulmonary disease for treatment by these preparations, and must be controlled by further observation.

CYCAS CHAMBERLAINII, A NEW SPECIES

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and

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TWO PLATES AND ONE TEXT FIGURE

The only native species of *Cycas* that has been definitely recognized in the Philippines is *C. rumphii* Miq. However, it has been known for some time that, in addition to this common coastal species, there was a slender mountain form with small seeds which was possibly, or probably, a distinct species. On two trips to Mount Arayat, we secured material of such a form in sufficient abundance to justify its description as a new species, and this has been named *C. chamberlainii* in recognition of the important contributions to the knowledge of the living cycads made by Dr. Charles J. Chamberlain, of the University of Chicago. This species was found on steep, rather rocky ridges at an elevation of about 800 meters. Mount Arayat, from which the material was collected, is an isolated cone situated in the great plain of central Luzon and reaches an altitude of 1,030 meters.

Cycas chamberlainii sp. nov.

Truncis tenuibus, circiter 10 cm diametro. Foliis 115 ad 160 cm longis, 40 ad 55 cm latis; foliolis 80 ad 95 utrinque, 9 ad 10 mm latis; sporophyllis ♀ 15 ad 22 cm longis, lamina subdeltoidea, ovata; fructibus obovoideis, 3.9 ad 4 cm longis, 2.9 ad 3.1 cm diametro; inflorescentiis ♂ (junioribus) ovoideis, 13 cm longis, 8 cm diametro.

A slender tree, seldom branched, trunk reaching a height of about 8 meters. Trunk of a 15 cm high specimen is 4 to 5 cm in diameter; a 10 cm high specimen, 3 cm in diameter; a 1 meter high specimen, 9 to 10 cm in diameter; old and large specimens, 15 to 20 cm in diameter. Younger part of stem covered with armor of leaf bases.

Leaves 115 to 160 cm long, 40 to 55 cm wide; length of leaf-bearing rachis, 90 to 115 cm; 80 to 95 leaflets on each side of rachis. Mature leaves vary with age from nearly glabrous to sparingly brown hairy on the undersurface of leaflets, particularly along midribs, rather densely so at base of leaflets on both surfaces, with prominent brown hairs on rachis, particularly along the sides. Petioles of young leaves densely brown hairy, rachis gradually less so toward the tip. Leaflets circinate when young, 9 to 11 mm wide, 20 to 30 cm long, opposite or alternate, slightly oblique, curved except near tip of leaf, gradually tapering to a sharp but not spiny point, base decurrent, margin revolute only in dried specimens. Rachis subterete, somewhat flattened above, when dry deeply grooved along the lines of the insertion of the leaflets, when green slightly grooved. Petiole spinous on the margins, spines 3 mm long.

Female sporophylls (Plate 1, fig. 1) densely brown tomentose, 15 to 22 cm long, lamina broadly subdeltoid to ovate, usually curved upward, frequently so much so that the tip is perpendicular to the stalk, 35 to 50 cm wide, bearing 4 to 10 spinelike projections on each side, the central projection 20 to 40 mm long, the lateral projection averaging 15 to 17 mm long. Stalk obscurely 4- to 6-angled, flattened, 15 to 20 mm wide just below the insertion of the basal pair of seeds. Ovules 4 to 6, usually 6, usually opposite. Seeds crowded below the lamina, inserted 18 to 30 mm apart, glabrous, obovoid, flattened, 39 to 40 mm long, 29 to 31 mm broad, 24 to 25 mm thick. Outer fleshy layer about 3 mm thick at side, stony layer about 1 mm thick, inner fleshy layer about 0.5 mm thick at base, elsewhere thinner. Prothallus 20 to 21 by 30 to 31 mm. Archegonia 2 to 6, usually 4 to 6, most frequently 5. In dry female sporophylls lamina is 20 to 55 mm wide, sporophyll just below the insertion of the lower pair of seeds 9 to 14 mm wide. Dry seeds 33 to 39 mm long, 23 to 26 mm wide, 19 to 21.5 mm thick.

Male cone (not quite mature), ovoid, rounded at the tip, 8 cm wide, 13 cm long (Plate 2). Male sporophyll wedge-shaped, edges slightly concave (Plate 1, fig. 2). Not quite mature sporophylls 33 mm long, 16 to 20 mm wide, short-stalked, upper surface smooth except at tip; tip densely brown tomentose, at upper surface continued into an erect slender spine about 1 cm long. Dry material same age as above, male sporophylls about 22 to 27 mm long, 13 to 16 mm wide.

LUZON, Pampanga Province, Mount Arayat, *Bur. Sci. 42539 Brown and Kienholz,* May 20, 1923.

Merrill[1] refers the common lowland form of *Cycas* to *C. rumphii,* but says it may not be distinct from *C. circinalis* Linn. It is still doubtful as to whether the lowland forms are of one species or whether they represent both *C. rumphii* and *C. circinalis. Cycas chamberlainii* is very distinct from *C. rumphii* in its much shorter and differently shaped female sporophylls and in the small size of the male cone, but particularly in the slender trunk and in the seed characters. The seed of *C. chamberlainii* is much smaller than that of *C. rumphii* and is obovoid rather than ellipsoid. The inner fleshy layer is thin throughout, while in *C. rumphii* it is very thick at the base (fig. 1).

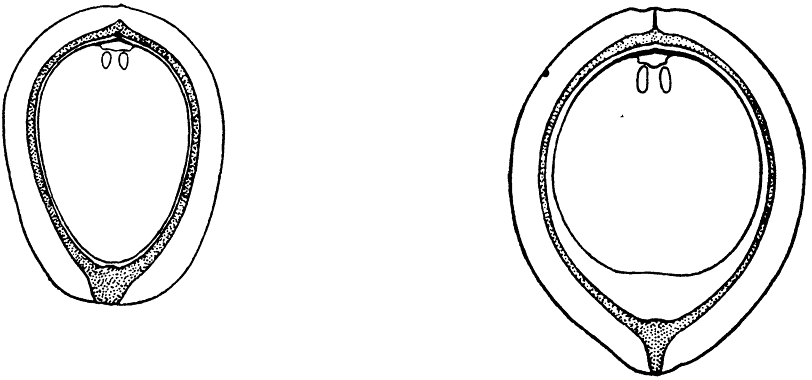

FIG. 1. Longitudinal sections through greatest diameter of seed of, left, *Cycas chamberlainii* sp. nov.; right, *C. rumphii* Miq. In both figures the stippled area is the stony layer; the thin layer (thick at the base in *C. rumphii*) within the stippled area is the inner fleshy layer, within which is the large prothallus. Natural size.

Cycas riuminiana Porte[2] has been reduced by Merill[1] to *C. rumphii* with which the published description of *C. riuminiana* agrees. The original description of *C. riuminiana* was based on sterile specimens, and the Latin diagnosis of the original description of *C. riuminiana* mentions no characters that are distinctive. The distinctive characters are given in comparison with *C. circinalis. Cycas riuminiana* is said to differ from *C. circinalis* in that the leaf scars disappear on the lower part of the trunk and the spines of the petiole extend from the base to the lowest leaflets. Both of these characters apply equally to *C. rumphii* and to *C. chamberlainii.* The leaflets are said to be smaller and less sword-shaped than in *C. circinalis.* The latter character is similar to *C. rumphii* rather than to *C. chamberlainii.* In general, the leaflets of *C. chamberlainii* are smaller than those of *C. rumphii* but the leaflets of *C. rumphii* show great variation and frequently are just as narrow as any we have seen on *C. chamberlainii.* The leaflets of *C. riuminiana* are said to be decurrent only one-third of the distance between two neighboring leaflets. In *C. chamberlainii* they are decurrent either to the next leaflet or nearly to the next leaflet. In *C. rumphii* they are also frequently decurrent to the next leaflet, but this character is variable. The description of *C. riuminiana* was based on sterile specimens and, in deciding whether *C. riuminiana* is more like *C. rumphii* than *C. chamberlainii,* the figure given with the original description is the most convincing evidence, as the figure represents a trunk with a diameter at least twice that of *C. chamberlainii* and similar to that of *C. rumphii.*

In the open grasslands of Culion there is a curious species of *Cycas* of which only the leaves are known and which, according to Merrill, perhaps represents *C. cairnsiana* F.-Muell.

ILLUSTRATIONS

PLATE 1

FIG. 1. *Cycas chamberlainii* sp. nov., ventral view of megasporophylls.
2. *Cycas chamberlainii* sp. nov., cross sections of male cone; left, ventral view; right, dorsal view.

PLATE 2

Cycas chamberlainii sp. nov., nearly mature male cone. The whorl of foliage leaves below the cone has been removed.

TEXT FIGURE

FIG. 1. Longitudinal sections through greatest diameter of seed of, left, *Cycas chamberlainii* sp. nov.; right, *C. rumphii* Miq. In both figures the stippled area is the stony layer; the thin layer (thick at the base in *C. rumphii*) within the stippled area is the inner fleshy layer, within which is the large prothallus. Natural size.

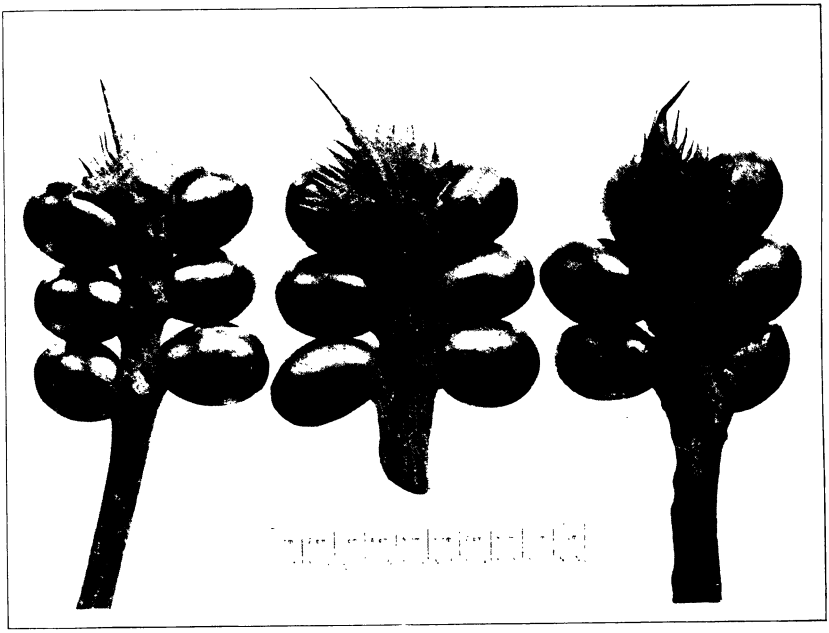

Fig. 1. Cycas chamberlainii sp. nov., megasporophylls.

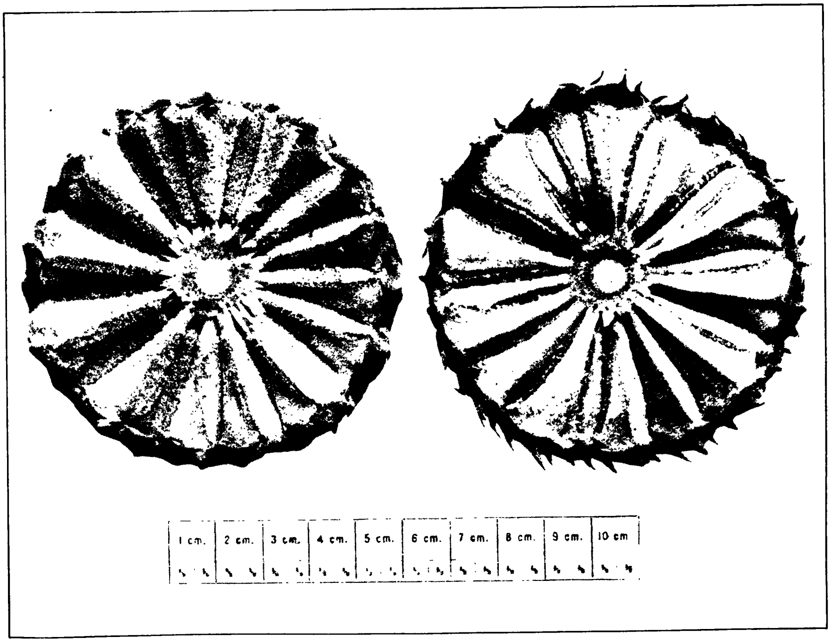

Fig. 2. Cycas chamberlainii sp. nov., cross sections of male cone.

PLATE 1.

UNIV OF MICH.

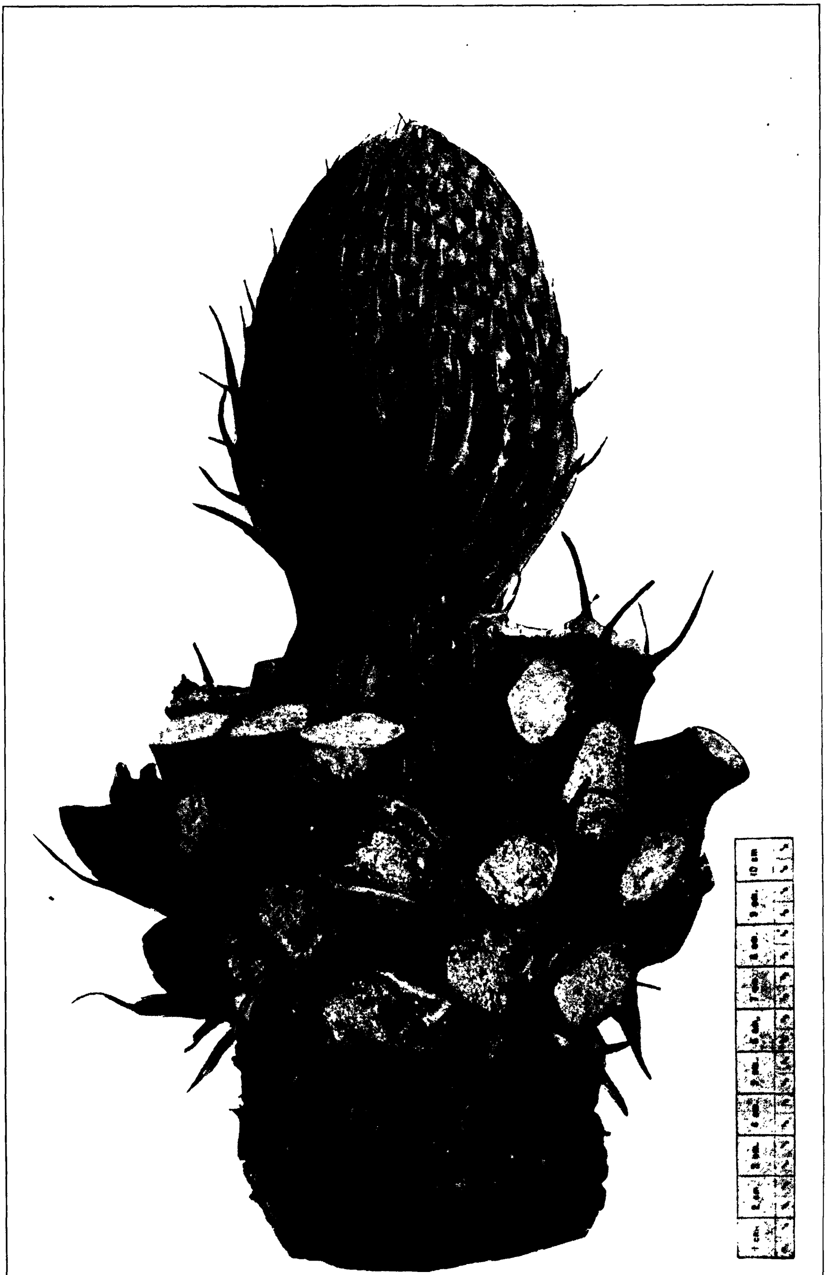

PLATE 2. CYCAS CHAMBERLAINII SP. NOV., MALE CONE.

UNIV. OF MICH.

SOME PHILIPPINE BEES

By T. D. A. Cockerell

Of the University of Colorado, Boulder

The bees recorded below were all collected by Mr. R. C. McGregor in Luzon, Philippine Islands; although there is only one new species, the records of localities and habits are of value.

BEES FROM BANGUI, ILOCOS NORTE

Bangui, at the northern end of Luzon, is about halfway between Manila and Formosa. Nevertheless, the bee fauna, so far as the collection shows, is like that of other parts of Luzon. The bees were all collected in November, except the *Mesotrichia*, in October.

Mesotrichia philippinensis chlorina Cockerell.

Both sexes.

Apis indica nigrocincta Smith.

Many workers.

Crocisa crucifera Cockerell.

Two females.

Anthophora korotonensis Cockerell.

Both sexes.

Nomia quadrifasciata notha Cockerell.

Both sexes.

Trigona biroi Friese.

Two workers.

Allodape mindanaonis reducta Cockerell.

Three females. New to Luzon.

Ceratina philippinensis Ashmead.

One male.

Ceratina tropica Crawford.

One male.

Nesohalictus robbii Crawford.

Nine females at flowers of *Ipomoea pes-caprae.* This is the first record of the flower-visiting habits of this remarkable long-tongued halictine.

Halictus thoracicus merescens Cockerell.

One female, different from typical *merescens* in having the light hair of thorax and abdomen clear white.

Halictus oligostictus Cockerell.

Thirteen females, of which eleven were found nesting and are accompanied by the following note, dated November 1, 1923:

> In forest small bees have holes in damp blackish clay under shade of shrubs. Little piles of earth over each hole. Holes may be close together (2 to 3 centimeters apart), or 20 to 30 centimeters apart. An area of 3 or 4 square meters, perhaps more, with these holes. One hole went down perpendicularly for about 5 centimeters, then took a slight turn and was at least 7 centimeters deeper. I could not determine anything beyond that depth. Bees came in and hovered over holes. They looked like dung beetles.

BEE FROM SOLSONA, ILOCOS NORTE

Megachile subrixator Cockerell.

One female, December.

BEES FROM MANILA

The specimens from Manila were taken in August.

Mesotrichia philippinensis chlorina Cockerell.

Both sexes.

Apis indica nigrocincta Smith.

Three workers.

Anthophora korotonensis Cockerell.

One female.

Allodape sauteriella Cockerell.

One female. Described from Formosa; new to the Philippine Islands. Could it have been accidentally introduced?

Ceratina philippinensis Ashmead.

One female.

Ceratina mcgregori sp. nov.

One male. Like *Ceratina tropica* Crawford, but differing thus: Apical yellow band of clypeus broader, gradually rising to the median point (abruptly in *C. tropica*); clypeus higher, face narrower; lateral face marks narrowly continuous, the upper part elongate, the broadened (bell-shaped) lower part with a small notch on inner upper side; no yellow frontal spots; yellow mark on scutellum narrower, quadrate; area of metathorax rougher; hind tibiæ with a yellow stripe extending their whole length posteriorly; hind basitarsi pale yellow, red at tip.

BEES FROM LIMAY, BATAAN PROVINCE

The specimens from Limay were collected in September, 1920.

Mesotrichia major Maidl.

One male.

Mesotrichia philippinensis chlorina Cockerell.

One female.

Trigona biroi Friese.

Four workers.

Crocisa crucifera Cockerell.

Two females.

Ceratina philippinensis Ashmead.

One female.

Megachile laticeps Smith.

One male.

Nomia philippinensis Friese.

One female.

NEW OR LITTLE-KNOWN WATER STRIDERS FROM THE ORIENTAL REGION

By TEISO ESAKI

Of the Entomological Laboratory, Department of Agriculture, Kiushiu Imperial University, Fukuoka, Japan

TWO PLATES

The present paper is a part of my studies on the Gerridæ of the Far East undertaken at the Zoölogical Institute, Tokyo Imperial University, under the supervision of Prof. S. Goto. Some of the material upon which this paper is based was received from Prof. S. Matsumura, of the Hokkaido Imperial University, Sapporo; Dr. T. Shiraki and Messrs. R. Takahashi and J. Sonan, of the Government Research Institute of Formosa; Dr. A. Seitz, of the Senckenbergische Naturforschende Gesellschaft in Frankfurt am Main; and Mr. S. Sakaguchi, of Okinawa. I extend my sincere thanks to all of these gentlemen for their kind assistance.

Limnometra palauana sp. nov.

Body dark yellowish brown. Head dark yellowish brown, with a somewhat indistinct black fascia along the inner margin of eyes; apex black and shining; fasciæ on vertex very obscure. Antennæ dark brown. Pronotum dark yellowish brown, with the central and marginal lines black; margin and the area along the central median black line yellow. Hemielytra dark yellowish brown, veins much darker. Legs dark yellowish brown. Undersurface of body pale yellowish brown, with two longitudinal black fasciæ on mesopleura.

First and fourth joints of antennæ subequal in length, second about two-thirds of first, third a little shorter than first.

Length of body, male, 9 millimeters; female, 11.

Holotype (male), allotopotype (female), and paratopotypes collected on January 8, 1915, on Palau Island, Micronesia, by S. Fujita; presented by Prof. S. Matsumura; in my collection.

This species is nearly allied to *Limnometra annulicornis* (Breddin) from Celebes in shape and coloration, but is much smaller, and the marking on the vertex is much more obscure.

Gerris cui sp. nov. Plate 1, figs. 1 and 2.

Body dark brown, or rather cinereous. Antennæ brown, with the apical two joints much darker. Rostrum and legs pale brown, apex of intermediate and posterior femora and whole of tibiæ and tarsi much darker. Undersurface of body excepting the acetabula black, velvetly pubescent.

Antennæ with the fourth joint nearly as long as the first. Vertex more or less conspicuously globulose. Calli of pronotum rather distinct, central median line carinated, humeral angles conspicuous. Connexivum very wide and well defined, lateral angles of sixth abdominal segment acute. Male, sixth ventral abdominal segment strongly sinuate. Genital segments in both sexes rather small.

Length of body, male, 11 millimeters; female, 12.5.

Holotype (male), allotopotype (female), and paratopotypes collected on August 17, 1921, at Tattaka, central Formosa, about 2,250 meters altitude, by Teiso Esaki; in my collection.

The nearest ally of this species is *Gerris gracilicornis* (Horváth), widely distributed throughout the Oriental Region as far as Japan proper, but the two species differ in size, general coloration, and shape of genital segments.

Tenagogonus nymphae sp. nov. Plate 1, figs. 3 and 4.

Head and pronotum black and shining. Antennæ brown with the apical two joints black. Eyes blackish brown and shining. Hemielytra dark gray, thin, iridescent. Legs pale yellowish brown, with the apices of tibiæ and tarsi much darker; anterior femora with two fine longitudinal lines on the anterior side, intermediate femora with a more or less indistinct longitudinal line. Undersurface of body pale brownish white, with the abdomen more or less clouded. Two longitudinal lines on the anterior portion of vertex and a U-shaped marking on the posterior margin of it light brown. Two small longitudinal spots on the anterior lobe of pronotum, central median line and lateral and posterior margins of the same light yellow.

First joint of antennæ longer than any other, the remaining three joints almost equal to one another in length, very slender. Vertex moderately convexly swollen. Pronotum triangularly prolonged backward, with the humeral angles distinct. Male, sixth ventral abdominal segment considerably sinuate, genital segments very large. Female, genital segments very small.

Length of body, male, 8.5 millimeters; female, 9.5.

Holotype, male, collected on September 14, 1921, at Taihoku, northern Formosa; allotype, female collected on September 7, 1921, at Tainan, southern Formosa, by Teiso Esaki; in my collection. A few paratopotypes and paraidiotypes from the following localities also in the collection: Suö and Kappanzan, northern Formosa; Kanshirei and Ampin, southern Formosa.

Somewhat allied to *Tenagogonus nitidus* (Mayr) from Ceylon but much larger and quite distinct.

Tenagogonus okinawanus sp. nov. Plate 1, figs. 5 and 6.

This species is closely allied to *Tenagogonus nymphae* sp. nov., but differs from it in the following points: The body is much stouter and larger; the legs are thicker and much longer proportionally; and in the male the sixth ventral abdominal segment is more roundly sinuate and the genital segments are different in shape.

Length of body, male, 8.5 millimeters; female, 10 to 10.5.

Holotype, apterous male, collected on March 1, 1922, at Naha, Okinawa, by J. Sonan; allotype, winged female, collected in August, 1921, in Okinawa, by S. Sakaguchi; in my collection.

Ptilomera sumizome sp. nov. Plate 1, figs. 7 and 8.

Body above and below black, undersurface more or less pubescent. Lateral sides of tylus, two small spots on anterior margin of pronotum, lateral margins of mesonotum, and two spots on anterior margin and two spots at middle of mesonotum silverly sericeous. Antennæ and legs all black.

Male.—Genital segments much longer than the rest of abdomen, much angulated laterally. First segment rectangular, slightly longer than broad. Hyperpygium transverse, much projecting posterolaterally, with the posterior margin rather truncate, a little protruded posteriorly at center. Hypopygium tapering posteriorly, with the apex strongly turned upward. Styles slender, almost reaching the end of hypopygium, curved toward the outer sides.

Female.—Apical spines of connexivum produced posteriorly and a little bent downward. Lateral lobes of first genital segment bidentated at posteroventral portion, superior tooth very acute, directed perpendicularly downward, inferior one nearly rectangular.

Length of body, male, 14.5 millimeters; female, 13.

Holotype (male), allotopotype (female), and three female paratopotypes collected on January 2, 1910, in southeastern Celebes; kindly presented by Dr. A. Seitz; in my collection.

This species is somewhat allied, in the structure of the genital segments, to *Ptilomera pamphagus* Breddin, from Celebes, but differs distinctly in details, and the black coloration immediately differentiates the species from the latter, which is "sordide ochraceo."

Rhyacobates takahashii Esaki. Plate 1, figs. 9 to 12.

Rhyacobates takahashii ESAKI, Philip. Journ. Sci. 22 (1923) 388, pl. 1.

The macropterous form was not described in the original description, but will be given here. The following characters are added to the generic diagnosis:

Macropterous form.—Pronotum much broader and prolonged posteriorly, covering the mesonotum. Posteriorly prolonged portion very broad and rather globulosely convex, shining, slightly carinated along the central median line, posterior margin arcuately convex, humeral angles prominent. Scutellum entirely concealed. Hemielytra very long, much protruded from end of abdomen in female.

The nearest ally of this genus is the well-known Oriental genus *Ptilomera*, in which, however, the males are extremely modified, quite contrary to this genus.

Macropterous form of the species.—Anterior portion of pronotum almost corresponding to whole of that of the apterous form, central dark brown spot prolonged and pointed posteriorly. Posterior part of the same very broad, globulosely convex, shining black, slightly elevated along the central median line, humeral angles prominent, posterior margin rather dilated and very brownish. Hemielytra black but rather brownish, with the veins black, distinct.

Length of body, female, 9.5 millimeters (to the end of the hemielytra).

Morphotype of the macropterous form, female, collected in March, 1918, at Taito, southern Formosa, by S. Inamura, J. Sonan, and M. Yoshino, collection No. 2499; in the collection of the Department of Agriculture, Government Research Institute of Formosa in Taihoku. The macropterous form seems extremely rare, as I have never seen a second specimen.

Rhagadotarsus kraepelini Breddin. Plate 1, figs. 13 to 17.

Rhagadotarsus kraepelini Breddin, Mitt. Nat. Mus. Hamburg 22 (1905) 137; Bergroth, Philip. Journ. Sci. § D 13 (1918) 122; Esaki, Trans. Nat. Hist. Soc. Formosa 12 (1922) 55.

Nacebus dux Distant, Ann. Mag. Nat. Hist. VIII 5 (1910) 153; Faun. Brit. Ind., Rhyn. 5 (1910) 166.

This curious species is widely distributed in the Oriental Region, though apparently not very common. The split anterior tarsi bring to mind those of the intermediate pair of the veliid genus *Rhagovelia*.

This species is always found on the calm surface of ponds and lakes, never on moving water. The silvery gray patterns on the back seem so conspicuous and strange that the insects are at once found by a collector, notwithstanding their minute size, but they are very smart and can hardly be captured without a net. The slender antennæ and legs are extremely delicate, and those of the living insects or of alcoholic specimens are sometimes very brittle. The insects were found by me on August 13, 1921, on Jitsugetsutan Lake, central Formosa, where they are not scarce at the shaded places near the border. Also not rare in September on the ponds of the botanic garden and of the park in Taihoku City, northern Formosa.

Those from Jitsugetsutan are distinctly smaller than the topotypical form, measuring, male, 3 millimeters; female, $3\frac{2}{3}$.

"Male $3\frac{2}{3}$ mm., female $4\frac{1}{5}$ mm." (Java, after Breddin).

Those from Taihoku, however, are quite referable in size to the topotypical form, but the silvery gray markings on the dorsal surface are much larger and more conspicuous, and with a very distinct spot of the same color on the vertex anterior to its brownish posterior margin, which is practically absent in those from other localities.

Metrocoris brevis Mayr. Plate 2, figs. 18 and 19.

Metrocoris brevis Mayr, Verh. Zool.-Bot. Gesell. Wien 15 (1865) 445; Novara Exped., Hemip. (1866) 179; Dahl, Plank. Exped., Humboldt-Stiftung 2 G. a. (1893) 8.

I do not consider that *Metrocoris brevis* Mayr, described only in the macropterous form, is synonymous with *Metrocoris ståli* (Dohrn) though some authors regard them as the same species. The macropterous form of a species of this genus found in Formosa is quite referable to *Metrocoris brevis* Mayr, but the apterous form of it seems quite different from that of *Metrocoris ståli* (Dohrn). Therefore, I identify this species as the former, which is distinct from the latter.

Both forms are figured in this paper. The species is not rare on the mountain streams in Formosa. The macropterous form is extremely rare; I examined only three, one male and two females, of which one had the apex of the hemielytra mutilated by the insect itself. This species is somewhat allied to *Metrocoris histrio* (White) (Plate 2, figs. 20 and 21), but is more elongated, and the pronotum and hemielytra in the macropterous form are much more protruded posteriorly. The details of the dorsal pattern in the apterous form are also quite different, as shown in the figures.

Habitat.—Formosa, Urai, Sôzan, Horisha, Musha, Kuraru, Taito. Also known from Ceylon.

Genus **AMEMBOA** novum

Apterous form.—Body rather fusiform, somewhat elongate. Head broader than long, much longer than between eyes; apex moderately projected; posterior margin straight, antennal depressions very shallow. Eyes hemispherical, very prominent, almost straight at the inner margins, the latter separated from each other; almost free from anterior margin of pronotum. Rostrum long, extending much beyond anterior coxæ; basal two joints very short, third very long, touching anterior margin of mesosternum; fourth a little shorter than half the length of third. Antennæ very long and thin, longer than body in the male and nearly as long as body in the female; first a little stouter than the other joints, remarkably curved outwardly; second and third subequal in length, a little shorter than first; fourth longest, about one and a half times the length of third. Pronotum transverse but narrower than head; anterior margin almost straight, scarcely touching eyes; posterior margin moderately convexly sinuate. Mesonotum very large, moderately sinuate anteriorly; lateral sides nearly parallel, moderately convexly swollen above. Metanotum well defined from the mesonotum. Abdomen about as long as or a little shorter than mesonotum and metanotum together; connexivum very broad and distinct, widest at second abdominal segment, vanishing into a point posteriorly, and in the male forming a spine. Genital segments in both sexes rather short. Anterior legs moderately stout, femora much incrassate, tibiæ nearly as long as femora, tarsi short, with the first joint a little shorter than second (female) or about one-half the length of latter (male). Intermediate legs moderately slender, femora a little stouter, tibiæ about two-thirds the length of femora, tarsi about three-fifths the length of tibiæ, first joint about twice as long as second. Posterior legs also slender, femora a little shorter than the intermediate ones, tibiæ shorter than half the length of femora, tarsi shorter than tibiæ, first joint longer than second.

Macropterous form.—Pronotum much prolonged backward, covering mesonotum. Anterior constricted portion almost the same as pronotum, entire in apterous form; prolonged portion convex, more or less well defined from the anterior portion; humeral angles moderately prominent; apex moderately rounded; slightly elevated along central median line. Scutellum concealed under the prolonged portion of pronotum. Hemielytra very much longer than abdomen, veins distinct.

Orthotype, *Amemboa fumi* sp. nov.

This genus is somewhat allied to *Metrocoris* Mayr but is quite distinct from it in the structure of head, eyes, antennæ, pronotum, and legs.

Amemboa fumi sp. nov. Plate 2, figs. 22 to 29.

Apterous form.—Body black with yellowish brown markings above (in a few specimens the black area much reduced); pale yellowish brown with the black marking beneath. Head yellowish brown with somewhat ill-defined fasciæ on vertex, pale yellowish brown beneath. Antennæ pale brown with the apices of first and second joints black, whole of third and fourth darker. Rostrum pale yellowish brown with a black line beneath. Eyes dark brown, shining. Pronotum black with three yellowish brown longitudinal fasciæ, of which the lateral two are much widened posteriorly. Mesonotum black with five rows of yellowish brown markings, of which the central one is straight, the middle pair broadest, rather irregularly constricted before the middle, and the outer pair narrow, sometimes separated into two markings. Sides of mesonotum velvety, strongly shining silvery. Prosternum and mesosternum pale yellowish brown, with two black fasciæ at the lateral portions of the latter, metasternum black. Legs pale brown with the apices of femora and tibiæ black. Abdomen black, lateral portions of ventral surface sometimes pale yellowish brown, genital segments pale yellowish brown beneath. Connexivum pubescent. Posterior margin of first genital segment truncate in both sexes. Male, dorsal first genital segment almost rectangular, second almost concealed dorsally.

Macropterous form.—Anterior portion of pronotum corresponding to pronotum, entire in the apterous form, posteriorly prolonged portion black with the posterior margin yellowish brown. Hemielytra black, with the veins distinct and paler in color.

Length of body, male, 3.5 to 4 millimeters; female, 4 to 4.5; to the end of hemielytra in the macropterous form, male, 5 millimeters.

Holotype (apterous male), allotopotype (apterous female), collected on October 1, 1921, at Urai, northern Formosa, by Teiso Esaki, and many paratypes from Urai, Sankakuyu (Sankei), Tôyen, Musha, Kanshirei, Kôshun, and Kuraru; in my collection. Morphotype and the unique specimen of the macropterous form (male), captured by J. Sonan, K. Miyake, and M. Yoshino, in May, 1918, at Kôshun, southern Formosa; in the collection of the Department of Agriculture, Government Research Institute of Formosa. This species is common on the small mountain streams throughout Formosa.

ILLUSTRATIONS

PLATE 1

FIG. 1. *Gerris cui* sp. nov., male genital segments, ventral view.
2. *Gerris cui* sp. nov., female genital segments, ventral view.
3. *Tenagogonus nymphae* sp. nov., male genital segments, ventral view.
4. *Tenagogonus nymphae* sp. nov., female genital segments, ventral view.
5. *Tenagogonus okinawanus* sp. nov., male genital segments, ventral view.
6. *Tenagogonus okinawanus* sp. nov., female genital segments, ventral view.
7. *Ptilomera sumizome* sp. nov., male genital segments, dorsal view.
8. *Ptilomera sumizome* sp. nov., female genital segments, lateral view.
9. *Rhyacobates takahashii* Esaki, female, apterous form, abdomen, dorsal view.
10. *Rhyacobates takahashii* Esaki, female, apterous form, abdomen, lateral view.
11. *Rhyacobates takahashii* Esaki, female, macropterous form.
12. *Rhyacobates takahashii* Esaki, hemielytra.
13. *Rhagadotarsus kraepelini* Breddin, male.
14. *Rhagadotarsus kraepelini* Breddin, male genital segments, dorsal view.
15. *Rhagadotarsus kraepelini* Breddin, female genital segments, dorsal view.
16. *Rhagadotarsus kraepelini* Breddin, male genital segments, ventral view.
17. *Rhagadotarsus kraepelini* Breddin, female genital segments, ventral view.

PLATE 2

FIG. 18. *Metrocoris brevis* Mayr, male, apterous form.
19. *Metrocoris brevis* Mayr, male, macropterous form.
20. *Metrocoris histrio* (White), male, apterous form.
21. *Metrocoris histrio* (White), male, macropterous form.
22. *Amemboa fumi* sp. nov., apterous male.
23. *Amemboa fumi* sp. nov., macropterous male.
24. *Amemboa fumi* sp. nov., antenna.
25. *Amemboa fumi* sp. nov., male anterior leg.
26. *Amemboa fumi* sp. nov., male genital segments, dorsal view.
27. *Amemboa fumi* sp. nov., female genital segments, dorsal view.
28. *Amemboa fumi* sp. nov., male genital segments, ventral view.
29. *Amemboa fumi* sp. nov., female genital segments, ventral view.

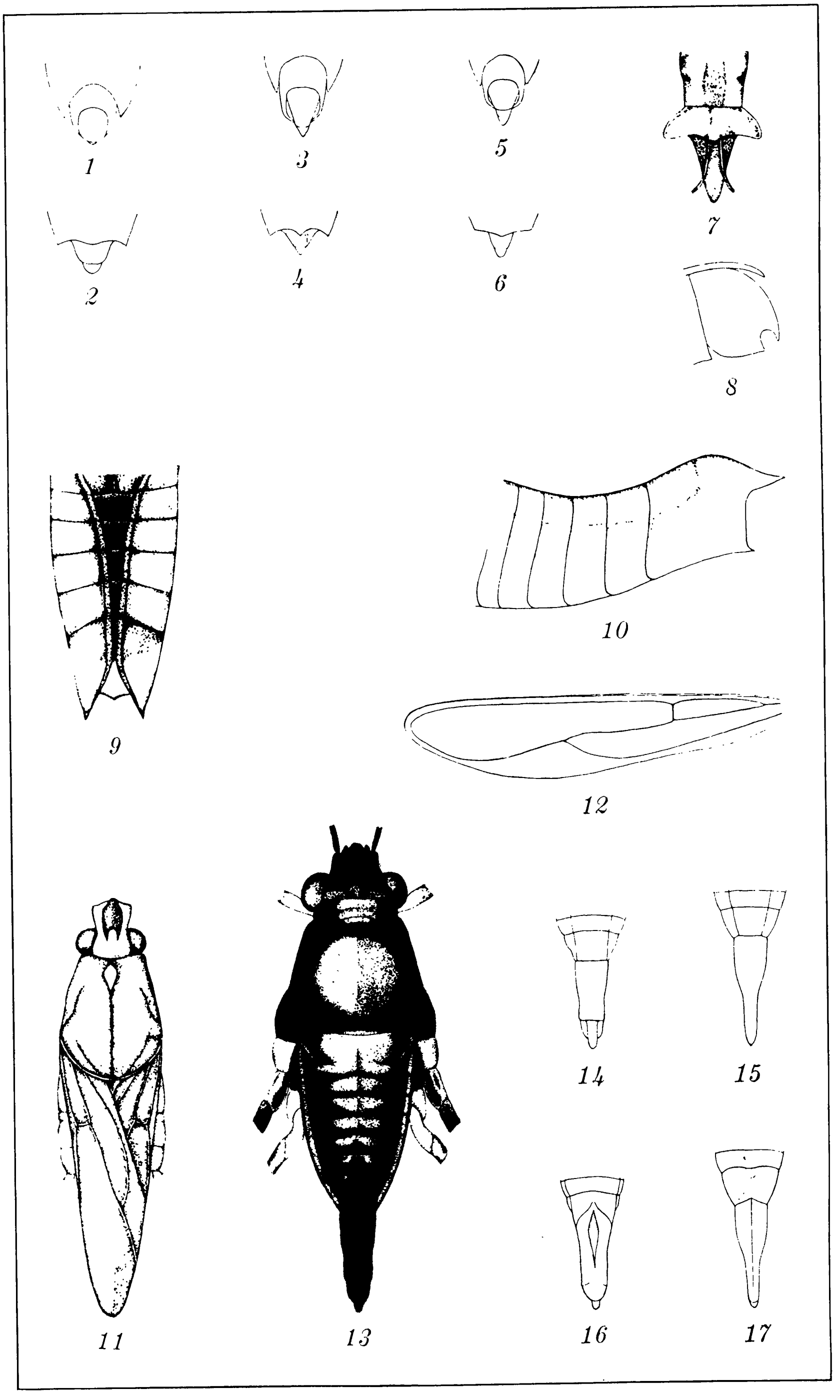

PLATE 1.

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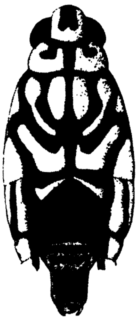
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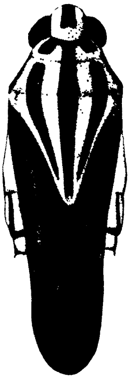
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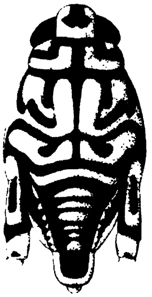
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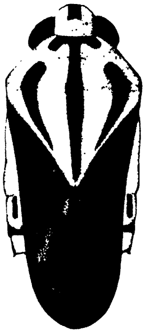
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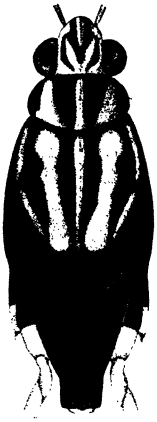
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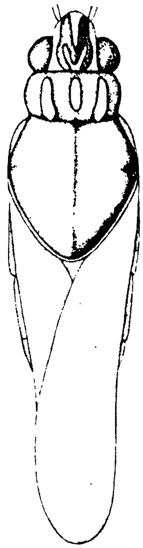
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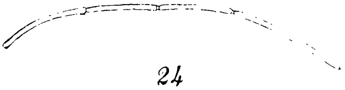
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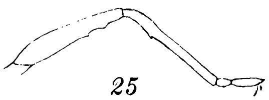
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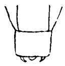
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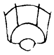
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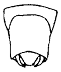
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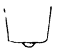
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PLATE 2.

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DIE TENEBRIONIDEN (COLEOPTERA) DES INDO-MALAYISCHEN GEBIETES, UNTER BERUECKSICHTIGUNG DER BENACHBARTEN FAUNEN, I

EINLEITUNG SOWIE DIE GATTUNG BYRSAX PASCOE

Von HANS GEBIEN
Hamburg, Deutschland

EINE TAFEL

EINLEITUNG

Mit vorliegender Arbeit beginnt eine Revision der indischen Tenebrioniden. Die ausserordentliche Reichhaltigkeit der Fauna des indo-malayischen Gebietes zeigt sich auch bei dieser stark vernachlässigten Insektenfamilie, deren Vertreter sich in bedeutender Arten- und Individuenzahl in allen Sammlungen finden. Nur ein verhältnismässig kleiner Teil dieser Tiere ist bisher beschrieben. Weitaus die meisten Arten sind nur der Gattung nach bestimmt gewesen und ein nicht unwesentlicher Teil war allein als Tenebrionide bezeichnet. In dieses Chaos etwas Ordnung zu bringen ist eine langwierige und schwierige, aber auch dankbare Aufgabe. Niemals hat irgend einer der älteren Autoren versucht Gattungen oder Arten dichotomisch auseinanderzuhalten, nur zahllose, zusammenhanglose Einzelbeschreibungen liegen vor. Zwar habe ich in der Bearbeitung der Faunen von den Philippinen, von Formosa, und von Borneo versucht Tabellen aufzustellen, aber die können weitergehenden Ansprüchen nicht genügen, weil sie eben nur die Arten eines engbegrenzten Gebietes berücksichtigen.

Ungemein fruchtbar ist Fairmaire gewesen, der weitaus die meisten Beschreibungen indo-malayischer Tenebrioniden geliefert hat. Seine Arbeiten lassen in den meisten Fällen das ihm vorliegende Objekt wieder erkennen. Schlimm dagegen sind die Beschreibungen von Chevrolat und Motschulsky, die gerade bei den Diaperinen zum Schaden für die Entomologie tätig gewesen sind, und ganz unbrauchbar ist Walkers Arbeit über die Tenebrioniden von Ceylon. Ueber die Arten dieser Autoren einwandfrei Aufschluss zu geben, war mir nicht immer möglich. Auch die Arbeiten von Schaufuss können nur sehr bescheidenen Ansprüchen genügen.

Wenn auch in dieser Arbeit die Kenntnis der Fauna der Sundainseln in erster Linie gefördert werden soll, so habe ich es doch für wünschenswert gehalten, auch die benachbarten Gebiete eingehend zu berücksichtigen. Zoogeographisch lässt sich Indien, besonders aber Hinterindien und Malakka, von den Sundainseln nicht trennen. Die Philippinen haben zwar manche eigenartige Formen, gehören aber auch durchaus zum indischen Faunengebiet. Auch nach dem papuanischen Gebiet hin ist keine sichere Grenze zu suchen. Ich habe zum Beispiel die Fauna von Celebes in der vorliegenden Arbeit mit berücksichtigt, nicht nur weil diese Insel viel indo-malayische Faunenelemente beherbergt, sondern auch aus Zweckmässigkeitsgründen; alle östlich davon liegenden Inseln sind in meiner Bearbeitung der papuanischen Fauna[1] eingehend behandelt worden. Darum war es empfehlenswert, die Fauna von Celebes jest zum Vergleich mit heranzuziehen. Ebenso ist die Fauna von Japan, Südchina, und Formosa, wenigstens in den dichotomischen Tabellen, mit berücksichtigt worden. Das bedarf kaum einer Rechtfertigung.

Eine eingehende Betrachtung der Zoogeographie des behandelten Gebietes kann jedoch erst am Schluss der ganzen Arbeit gegeben werden. Es ist bei den andern Unterfamilien (besonders bei den Cnodaloniiden, die artlich und generisch ganz ungeklärt sind) so ausserordentlich viel Neues zu behandeln, das es ungerechtfertigt wäre, schon jetzt auf zoogeographische Fragen einzugehen.

Im allgemeinen sind alle Arten neu beschrieben worden. Nur bei den Arten von denen eine neuere, eingehende Beschreibung vorliegt, glaubte ich darauf verzichten zu dürfen.

Das mir vorliegende Material entstammt den Museen Berlin, Dahlem, Stettin, Hamburg, München, Dresden, Leyden, und London, und den Sammlungen Veth †, Drescher, Gebien. Besonders wertvoll war mir auch das von den Herren Prof. Baker und W. Schultze auf den Philippinen gesammelte Material.

Für die Herstellung der ausgezeichneten Photographien habe ich wieder Herrn Rechnungsrat P. Timm in Zoppot su danken. Herr Borchmann unterstützte meine Arbeit durch eine Anzahl Zeichnungen. Auch ihm an dieser Stelle meinen Dank abzustatten, ist mir eine angenehme Pflicht.

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[1] Nova Guinea 13 (1920) 213–500.

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BOLITOPHAGINÆ

Diese Unterfamilie, welche Vertreter in allen Erdteilen hat, ist im Bereich des indo-malayischen Gebietes vorzüglich vetreten. Hier finden sich die bizarren Formen von *Byrsax*, hier die so hoch entwickelten *Atasthalus*-Arten. Hier ist auch das Zentrum der artenreichsten Gattung der Bolitophagiden, *Bradymerus*. Alle Angehörigen der Unterfamilie scheinen Bewohner von Baumschwämmen zu sein. Leider ist nicht ein Wirtspilz dem Namen nach bekannt, und das ist sehr schade, denn die oft überraschende Verbreitung der Insekten unserer Gruppe lässt sich nur durch die des Wirtspilzes erklären und es dürften die Arten, ähnlich wie die europäischen, ziemlich monophag sein. Die Gattung *Byrsax* zum Beispiel hat ausser auf Ceylon, wo sie gut entwickelt ist, und Indien, wo nur *B. cornutus* vorkommt, eine Anzahl Arten auf Malacca und sämtlichen Sunda-Inseln, ferner eine auf den Philippinen. Im ganzen papuanischen Gebiet fehlt sie und tritt erst wieder in Australien auf. *Dicraeosis* sendet auf die Sunda-Inseln nur zwei Arten aus, nach den Philippinen eine, von denen eine beschrieben ist. Auf Formosa dagegen ist sie gut entwickelt. Die weiteste Verbreitung hat *Bradymerus*, deren Gebiet von Australien bis Ostafrika reicht. Sie ist im indo-malayischen Gebiet reich an Arten, aber im papuanischen, das ebenfalls zahlreiche Arten hat, noch besser ausgebildet, wenigstens sind dort die grössten und abweichendsten Formen. Im übrigen wird über die geographische Verbreitung der indo-malayischen Tenebrioniden in einer späteren Arbeit zu berichten sein.

Dimorphismus.—Zweigestaltigkeit der Geschlechter ist bei den Tenebrioniden recht häufig. Es ist unverständlich dass Lacordaire angibt dass sexuelle Unterschiede bei Tenebrioniden im allgemeinen nicht vorkommen. Sie sind allerdings nicht immer auffallend. Es gibt aber kaum einen Körperteil der nicht bei der einen oder andern Gattung Geschlechtsunterschiede aufweist. Bei den Bolitophagiden finden sich meist eigenartige

Hornbildung am Kopf und am Pronotum des Männchens, bei einzelnen Arten (zum Beispiel *Sumbawia* und *Bradymerus incostatus*) zeigen sich Haarpolster an den Schienen. Wie fast immer bei den Insekten, sind es die Männchen welche die positiven sekundären Geschlechtsmerkmale aufweisen. Nur beim Weibchen von *Byrsax gibbifer* und einigen verwandten Arten ist das Pronotum in zwei Spitzen ausgezogen, ein Merkmal das dem Männchen fehlt, das dagegen auf dem Kopf Hörner trägt.

Neben dem sexuellen Dimorphismus tritt aber bei einigen Arten unseres Faunengebietes noch ein anderer innerhalb desselben Geschlechtes auf. Von *Atasthalus spectrum* liegen mir zwei Formen des Männchens vor. Ich habe bei der Art auseinandergesetzt warum ich nicht zwei Arten anzunehmen vermag. Ebenso beschreibt Lewis von *Bolitoxenus bellicosus* zwei verschiedene Männchen. Von *Bolitoxenus recticornis* dagegen werden hier zwei Formen des Weibchens beschrieben.

VARIABILITÄT DER MÄNNLICHEN GESCHLECHTSMERKMALE

Als sekundäre männliche Geschlechtsmerkmale bezeichnet man allgemein alle Bildungen am Körper des Männchens die dem Weibchen fehlen, und die nicht Ausgestaltungen des Geschlechtsorganes selbst sind. Aber diese Merkmale sind nicht gleichwertig. Eine ganze Anzahl dient zweifellos als Hilfsorgane bei der Begattung, so die Saugscheiben an den Vordertarsen der männlichen *Dytiscus*-Arten oder die erweiterten Tarsen bei vielen Caraben und Tenebrioniden, oder die stark verlängerten Vorderbeine mancher Chrysomeliden und Ruteliden. Andere dienen vermutlich zum Anlocken des weiblichen Geschlechts, zum Beispiel die Duftschuppen bei manchen Lepidopteren, die behaarten Gruben am Abdomen bei der Tenebrionidengattung *Blaps*. Bei *Psammodes* finden sich am Hinterleib des Männchens grosse Haarflecken, die bei einer Lauterzeugung wichtig sind. Von allen diesen Merkmalen, die direkt in den Dienst der Paarung gestellt werden, kann man sagen dass sie in auffällig geringem Maase variieren; und ein Fall, wie Ohaus bei Ruteliden berichtet, wo ein ausgesprochener Dimorphismus beim Penis des Männchens vorkommt, gehört sicher zu den grossen Ausnahmen. Die Umgestaltungen an Tarsen und Abdomen die bei der Begattung von Wichtigkeit sind, zeigen überraschende Konstanz. Sie bilden daher vorzügliche Gruppenmerkmale. So kommen erweiterte Vordertarsen ganzen Unterfamilien zu, die dadurch allein sicher von einer verwandten geschieden werden, so die Pedininen von den Opatrinen, so eine anzahl Unterfamilien der Caraben. Wenigstens sind sie gute Gattungsmerkmale.

Im Gegensatz dazu finden sich Geschlechtsmerkmale dritten Grades, die bei der Begattung direkt kaum eine Rolle spielen dürften, möglicherweise aber Waffen sind im Kampfe der Männchen untereinander um das Weibchen. Dazu gehören vor allen die Hornbildungen am Kopf und am Pronotum bei zahlreichen Käfergattungen vieler Familien, besonders vieler Lamellicornier; dazu gehören ferner die geweihartig entwickelten Mandibeln der Lucaniden. Diese Bildungen sind in hohem Maase veränderlich, wie wir uns bei irgend einer gemeinen Art exotischer Dynastiden, bei den gehörnten Coprophagen leicht überzeugen können. Auch viele Bolitophagiden-Gattungen bieten gute Beispiele dafür. Auffällig ist das zum Beispiel bei *Byrsax gibbifer*, bei *Atasthalus*, etc. Und gerade bei diesen veränderlichen Geschlechtsmerkmalen liegen viele Artmerkmale. Das ist keine neue Entdeckung, sondern nur ein neues Beispiel für diesen Satz, dessen allgemeine Bedeutung schon Darwin betont. Das macht die systematische Gruppierung eben so schwer. Die gut entwickelten Männchen mit vorzüglich ausgebildetem Hornschmuck sind nicht in der Ueberzahl, in manchen Fällen nur Ausnahmen. Und doch liegen hier die wichtigen Artmerkmale.

EINIGE BEMERKENSWERTE MORPHOLOGISCHE EIGENTÜMLICHKEITEN

Ein Merkmal von grösster Bedeutung für die Systematik der Tenebrioniden ist das Vorhandensein oder Fehlen einer glänzenden Gelenkhaut zwischen den letzten Abdominalsegmenten. Es ist geeignet, ganze Unterfamilienreihen zu scheiden. Leider finden sich an mehreren Stellen einige Gattungsgruppen, denen eine Gelenkhaut fehlt, innerhalb der Unterfamilien mit vorhandener Haut. Diese sind herauszuschälen, wollen wir nicht auf das im übrigen äusserst wichtige Merkmal verzichten. Die Bolitophagiden galten bisher als geschlossene Unterfamilie, die eine Gelenkhaut besitzt. Eine genaue Ueberprüfung der exotischen Gattungen zeigt jedoch dass sich auch hier einige Gattungen finden die eine Ausnahme machen. Ich habe sie abgesondert als Dysantinæ, nach der charakteristischen Gattung *Dysantes* Pascoe. Zu ihr gehören noch ein paar andere Gattungen, über die bei der folgenden Unterfamilie genauer berichtet wird.

Eine zweite Eigentümlichkeit dieser Unterfamilie, wenigstens einer Reihe von Gattungen, besteht in dem Vorhandensein einer Fühlerfurche, die allerdings ganz anders gebildet ist als bei andern Käferfamilien. Das Kinn und die Maxillen liegen stark erhöht, diese erhöhte Platte hängt scharfkantig über und so entsteht eine Rille, in welche die Fühler gelegt werden. Eine Bedeutung, etwa im Sinne eines Schutzes dieser Organe, ist nicht recht klar, denn die gerade bei den Gattungen, welche die Furchen zeigen, vorhandenen Hornbildungen scheinen dem zu widersprechen.

Uebersicht über die indo-malayischen Bolitophagiden-Gattungen.

1. Die Augen sind vollständig geteilt, Männchen ungehörnt, Fühler 11-gliedrig, das elfte Glied frei........ 2.
   Die Augen sind nur eingeschnürt........ 3.
2. Unterkopf mit Fühlerfurche, neben den Mundteilen hoch gekantet, diese daher hoch liegend. Epipleuren vollständig, Schienen ganz gekielt, erstes Glied der Hintertarsen sehr kurz (palaearktische und amerikanische Arten, einige auch in Japan, sonst in Asien nicht vertreten)........ **Bolitophagus** Illiger.
   Unterkopf ohne Fühlerfurche, neben den Mundteilen nicht gekantet, diese daher flach. Epipleuren verkürzt, Schienen schwach gekielt und nur in der Basalhälfte, erstes Glied der Hintertarsen so lang wie die beiden folgenden zusammen........ **Sumbawia** g. nov.
3. Männchen gehörnt, die Mundteile des Unterkopfes liegen hoch erhaben. ein hoher, blattartiger Kamm setzt die Seiten des Unterkopfes von der Mitte ab und bildet eine starke Fühlerfurche, in der die Fühler in gekrümmter Lage Platz finden. Palpen zylindrisch, Schienen scharf gekielt, Seitenrand des Körpers krenuliert oder gezähnt........ 4.
   Männchen ungehörnt, Unterkopf flach, ohne Fühlerfurche, Endglied der Palpen mehr oder minder beilförmig, Schienen meist ungekielt, Körperrand glatt, oder nur undeutlich und schwach krenuliert........ 7.
4. Fühlerglied 11 frei, nicht in das zehnte eingelassen, Rand der Decken stark verflacht, blattartig dünn. Epipleuren vorn ausgehöhlt, die Schenkel erreichen den Rand der Decken nicht........ **Byrsax** Pascoe.
   Elftes Fühlerglied in das zehnte eingelassen, und mit ihm scheinbar ein Glied bildend, Rand der Decken nicht breit verflacht abgesetzt. Epipleuren vorn nicht ausgehöhlt, die Schenkel erreichen oder überragen den Rand der Decken........ 5.
5. Körper zylindrisch, Ipiden-ähnlich, Flügeldecken gleichartig gekörnt. Männchen auf dem Clypeus mit kurzem, blattartigem Horn oder mit Zähnchen, Seiten des Pronotums senkrecht, nicht verflacht, Prosternum ungekielt und ohne Endzahn........ **Bolitonaeus** Lewis.
   Körper hochgewölbt mit verflachter Scheibe, Seiten des Pronotums wenigstens vorn verflacht, Prosternum gekielt, mit Endecke (Ausnahmen, *Bolitoxenus dentifrons* und *B. spathifer*)........ 6.
6. Halsschild bis hinten breit verflacht, Clypeusrand beim Männchen höchstens gezähnt (nur bei *B. spathifer* gehörnt).
   Bolitoxenus Motschulsky.
   Halsschild hinten ungekantet, Clypeus beim Männchen mit ein oder zwei starken Hörnern........ **Atasthalus** Pascoe.
7. Halsschild an den Seiten ganz ungekantet, Körper lang zylindrisch.... 8.
   Halsschild an den Seiten mit scharfer, vollständiger Randkante, Körper meist mehr oder minder flach........ 9.

8. Prosternum vorn senkrecht zur Anlegung des ganz hängenden Kopfes, Fühlerkeule 3- oder 4-gliedrig, Epipleuren vollständig, Pronotum vorn stark kapuzenförmig über den Kopf gezogen (*Stenochinus* Motschulsky) .... **Dicraeosis** Gebien.
   Prosternum vorn wagerecht und fast etwas ausgehöhlt, frei vom Kopf, dieser gross und hinten sehr dick, Fühlerkeule 7-gliedrig, Epipleuren stark verkürzt.. **Danodema** Gebien.
9. Augen beborstet, Körper gestreckt zylindrisch, Prosternum vorn und hinten senkrecht, Vorderkopf verkürzt, die Schläfen liegen dem Auge plattenförmig an, die Vorderecken des Pronotums liegen zurück. **Chaetopsia** g. nov.
   Augen kahl, Körper meist mehr oder minder flach, *Opatium*-ähnlich, Prosternum vorn und hinten mehr oder minder flach, die Schläfen nicht plattenförmig, die Vorderecken des Pronotums treten vor. **Bradymerus** Perroud.

Genus **BYRSAX** Pascoe

Byrsax Pascoe, Journ. Ent. 1 (1860–62) 42; 2 (1863–66) 459.

Die Gattung enthält nach meinem Katalog 12 Arten. Später beschrieben sind 3 Arten: *B. excisicollis* Gebien, *B. 4-nodosus* Gebien, und *B. satanas* Gebien. Von diesen ist die zweite nur eine Varietät von *B. gibbifer.*

Von den bekannten Arten fällt *B. coenosus* Pascoe als Weibchen von *gibbifer;* ebenso fällt auch *B. testudinarius* Motschulsky mit dieser Art zusammen. *Byrsax horridus* dürfte nichts anderes sein als *B. cornutus.* Die beiden Arten von Neu-Caledonien, *B. cancroides* und *B. cordicollis* Fauvel, gehören sicher nicht zur Gattung. Der Autor stellt sie in das Genus *Bolitotherus,* das nur in Amerika vorkommt. Er verwechselt aber, wie es scheint, *Bolitotherus* mit *Bolitonaeus* und begeht einen Irrtum den Candeze veranlasste, Gemminger und Harold im Katalog verewigten, und der in der Synonymie viel Unheil angerichte hat. Die richtige Synonymie ist von mir gegeben worden.[2] Es ist also anzunehmen, dass Fauvel nicht *Bolitotherus* sondern *Bolitonaeus* hat schreiben wollen. *Byrsax cancroides* dürfte tatsächlich in diese Gattung gehören und *B. cordicollis* ein *Atasthalus* sein. Mir sind beide Arten unbekannt. Hier treten nun 5 neue Arten zur Gattung. Pascoe stellt seine Gattung *Byrsax* zu den Colydiiden. Erst später in seiner Uebersicht taucht sie unter den Boletophaginen auf. Dass er sie ursprünglich garnicht zu den Tenebrioniden rechnet ist verzeihlich, er hielt die Tarsen für 4-gliedrig, und es gehört tatsächlich eine sehr genaue Untersuchung unter starker Vergrösserung dazu das fünfte Glied, nämlich das Grundglied der 4 vorderen Tarsen, zu erkennen. Es ist winzig klein, und besonders darum schwer zu entdecken weil die Tarsenglieder zur Aufnahme je des nachfolgenden Gliedes stark schräg abgeschnitten sind.

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[2] Coleopterorum Catalogus. Berlin (1910–1911) 359.

Da die Originalbeschreibung des Verfassers sehr dürftig ist und unter der Voraussetzung verfasst dass die Gattung in eine andere Käferfamilie gehört, da ferner nie wieder eine Beschreibung erfolgte, dürfte eine Neubeschreibung von Wert sein.

Beschreibung der Gattung.—Ausserordentlich bizarre Käferformen umfassend. Geflügelt, breit oval, oder von fast kreisförmigen Umriss, hoch gebuckelt.

Kopf senkrecht oder noch stärker geneigt, beim Männchen mit oft sehr langen, rauhen, unbehaarten Hörnern. Augen ungeteilt, Wangen beim Männchen eckig vortretend, Hinterkopf scharf gekantet und bis zu dieser Kante im Pronotum steckend, Epistom gerade abgestutzt, sehr kurz, Fühler 11-gliedrig, das letzte Glied ganz frei, es ist eine 7-gliedrige Keule von stark queren Gliedern vorhanden, Glied 3 ist zylindrisch, verlängert, aber wesentlich kürzer als 1; die Fühler liegen in einer Furche des Unterkopfes. Die Mundteile liegen erhöht und werden durch eine scharfkantige, überstehende Lamelle von den Seiten abgesetzt, unter dieser liegen die Fühler eingekrümmt. Mentum flach, Ligula stark entwickelt, vorn ausgerandet, Endglied der Maxillarpalpen fast zylindrisch, lang. Mandibeln zweispitzig, unter den Spitzen befindet sich ein starker häutiger Sack, Innenlade der Maxillen mit scharfem Hornhaken.

Halsschild mit stark und breit verflachten Seiten, am Rande gezähnt, Basis oft mit Ausschnitt, Scheibe gehöckert oder mit Spitzen, der Vorderrand ist vorgezogen und zuweilen mit zwei scharfen Spitzen versehen.

Flügeldecken mit tief herabgezogenen, breiten, blattdünnen Rändern, welche die sehr kurzen Beine verdecken. Die Randkante ist gesägt oder gezähnt, die Oberfläche ist grob gekörnt oder meist mit drei Haupthöckern auf jeder Decke versehen. Die Basis ist jederseits neben dem Schildchen winklig vorgezogen.

Das Prosternum ist zwischen den queren Hüften sehr schmal, hinten scharf gekielt, Mesosternum meist mit hoch erhabenen und gezähnten Kiel. Metasternum kurz, Abdomen mit Gelenkhaut zwischen den letzten Segmenten. Beine sehr kurz, Schenkel unten gekielt, Schienen hinten gekielt oder ohne Kiele. Tarsen kurz, das Grundglied der vorderen zwei Beinpaare undeutlich, das Klauenglied aller Beine lang, meist so lang wie die andern Glieder zusammen, die Glieder sind stark schräg abgeschnitten und oben eingedrückt.

Bestimmungstabelle fur die asiatischen Arten der Gattung Byrsax.[3]

1. Basis des Pronotums jederseits der Mitte mit einem halbkreisförmigen Ausschnitt oder am Grunde der seitlichen Verflachung mit tiefem, schlitzförmigen Einschnitt, Rand der Decken und des Pronotums kurz fingerförmig gezackt .... 2.

Basis des Pronotums ohne tiefen Einschnitt, Rand des Körpers fein winklig gesägt, nie fingerförmig .... 7.

2. Decken mit zahlreichen, ziemlich gleichmässigen, kleinen, etwas länglichen Erhabenheiten .... 3.

Jede Decke neben der Naht mit drei Haupthöckern .... 4.

3. Halsschildrand gleichmässig stark gebogen, jederseits des Schildchens findet sich ein dreifacher, langer Höcker, die Hörner des Männchens kurz und fast aufrecht. (Borneo, Java, Ceylon, Himalaya.)
B. tuberculatus Gravely.

Halsschildrand vorn hinter den Vorderecken leicht eingezogen, der dreifache Höcker an der Basis der Decken fehlt. Die Hörner der Männchen sind lang, von der Seite gesehen nach vorn gerichtet. (Japan.) .... **B. niponicus** Lewis.

4. Der Vorderrand der Verflachung an den Flügeldecken ist gleichfalls gezähnt, der hintere Höcker der Flügeldecken ist quer, Halsschild des Männchens vorn nicht gezähnt. (Ceylon, Indien, Sumatra (?).)
B. cornutus Fabricius.

Der Vorderrand der Flanken der Flügeldecken ist glatt, der hintere Höcker ist etwas länglich oder konisch, Halsschild beim Männchen am Vorderrand meist gezähnt .... 5.

5. Basis des Pronotums mit halbkreisförmigem Ausschnitt, Rand der Decken am Grunde der Zähnchen mit einer Reihe scharfer, kleiner Körner, Pronotum beim Männchen von der Mitte nach vorn mit starker Protuberanz, beim Weibchen vorn scharf 2-zähnig. Grosse Art. (Java, Borneo, Sumatra, Malacca.) .... **B. excisicollis** Gebien.

Basis des Pronotums mit schrägem, schlitzförmigen Einschnitt, Rand der Decken am Grunde der Zähne ohne Körnerreihe, Pronotum in beiden Geschlechtern anders gestaltet .... 6.

6. Männchen am vorderen Absturz des Pronotums mit zwei scharfen, nach aussen gerichteten Haken, die Decken ausser den drei Haupthöckern mit ein paar weiteren, fast ebensogrossen Vorragungen, Mittelbrust mit Zapfen. (Borneo.) .... **B. prolifericornis** sp. nov.

Männchen vorn am Pronotum ohne Haken und Vorragungen, Decken ausser den Haupthöckern nur mit kleinen Körnern, Mittelbrust ohne Kiel und ohne Zapfen. (Ceylon.) .... **B. ovipennis** sp. nov.

7. Der Halsschild ist hinter der Mitte kräftig gehöckert, die Ränder der Decken ausser der Reihe Körner am Grunde der Zähne ohne weitere Reihe, der Rand verhältnismässig schmal, in der Mitte nur ungefähr ein Drittel so breit wie eine Decke, letzter Höcker so gross oder grösser als die andern, Schienen deutlich gekielt.... **B. singhalus** sp. nov.

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[3] In dieser Uebersicht fehlt die kleinste Art, der 3 bis 4 Millimeter lange *B. spiniceps* Lewis aus Japan, der mir unbekannt ist.

Der Halsschild nur einfach, sehr stark gewölbt, Ränder der Decken mit einer Reihe Körner auf den Zähnen und einer andern weiter innen, die Verflachung meist viel breiter, Schienen undeutlich oder nicht gekielt. Letzer Höcker viel kleiner als die andern oder fehlend.... 8.

8. Körper wesentlich länger als breit, Rand der Decken etwa ein Drittel so breit wie der Teil innen von ihr, Randkante grob, fast rechtwinklig gezähnt, Decken ausser den drei Haupthöckern noch mit einigen sehr groben, höckerartigen Tuberkeln, Pronotum des Weibchens vorn einfach verrundet. (Philippinen.).. **B. satanas** Gebien.

Körper fast so breit wie lang, Rand der Decken in der Mitte halb so breit wie der innere Teil, Zähnelung sehr fein, stumpfwinklig, ausser den Haupthöckern sind nur feine Körner vorhanden, Pronotum des Weibchens mit zwei Vorragungen.. 9.

9. Die Vorderrandzähne des Pronotums beim Weibchen sind spitz, die Hörner des Männchens gegen das Ende kräftig verbreitert und verflacht.. **B. gibbifer** Wesmael.

Die Vorragungen des Pronotums beim Weibchen sind rund, die Hörner des Männchens sind rund, gegen das Ende kaum verflacht und nicht verbreitert. (Ceylon.).. **B. confrater** sp. nov.

Byrsax tuberculatus Gravely. Tafel 1, Fig. 7.

Byrsax tuberculatus GRAVELY, Rec. Ind. Mus. VIII 8 (1915) 522, t. 13, f. 2.

Byrsax contemptus Geb. in litt.

Klein, breit elliptisch, matt schwarzbraun, in die erdigen Reste des Wirtspilzes eingehüllt, von denen das Tier vor den Studium gereinigt werden muss.

Der Kopf ist spiegelblank, unpunktiert und nur hinten in der Mitte mit kurzer Stirnfurche versehen, die dünnen Wangen teilen die Augen in einen kleineren oberen und grösseren unteren Teil. Am Grunde der Hörner findet sich, die Augen innen einengend, eine konische Tuberkel; die Wangen sind halb so breit wie die Augen, vorn scharf gewinkelt, das Epistom ist gerade abgestutzt. Beim Männchen erheben sich auf dem Clypeus, im Halbkreis voneinander entfernt, zwei senkrechte Hörner, welche dem Kopf wegen seiner geneigten Haltung etwas anliegen, diese Hörner sind ziemlich lang, aussen gezähnt, etwas verflacht, aber gegen das Ende nicht verbreitert. Die Fühlerglieder sind vom fünften an innen stark sägezähnig verlängert, das letzte Glied ist schräge oval. Das Mentum ist quer trapezisch, ziemlich flach.

Der Halsschild ist stark quer, die Seiten sind breit und stark verflacht und sehr stark gerundet, hinter der Mitte am breitesten, der Rand ist mit acht bis zehn fingerartigen Zähnen versehen, von denen der letzte der Basis anliegt, zwischen diesem und dem vorletzten findet sich ein tieferer, schmaler Einschnitt; ein halbkreisförmiger Ausschnitt an der Basis fehlt, diese selbst liegt den Flügeldecken an. Dem Rande parallel läuft eine Reihe von grossen Körnern, die kaum kleiner sind als die der Scheibe, diese ist stark gewölbt, aber nicht gehöckert. Es findet sich jederseits der nur punktierten Mitte eine Reihe von unregelmässigen, ungleich weiten, nicht parallel stehenden Körnern, von denen die vorderen beiden grösser sind. Der Vorderrand ist in breitem Bogen vorgezogen, nicht mit Zähnchen versehen, auch nicht beim Weibchen. Am Absturz finden sich einige ebenso grosse, regelmässig gestellte Körner; der Grund ist punktiert.

Die Flügeldecken sind parallelseitig, der Rand ist nicht sehr stark verbreitert, nach unten gerichtet, er ist fingerartig gezähnt, die Zähne finden sich auch am Vorderrand neben den Schultern, werden gegen die Spitze immer feiner; sie selbst tragen keine Körner, die Körnerreihe findet sich entfernt von den Spitzen. Die hochgewölbte Scheibe hat keine eigentlichen Höcker wie die der meisten andern Arten, sondern mehrere undeutliche Reihen länglicher, oben mit scharfer Kante versehener Körner, welche nach den Seiten hin immer kleiner werden. Vorn, ziemlich weit jederseits vom Schildchen findet sich ein dreispitziger, kurzer Kamm und an den Seiten davon, nach den Schultern hin, ein stumpfer, mehrspitziger Höcker.

Das Prosternum ist vorn schwach gekielt, etwas über die Hüften hinaus verlängert, fällt dann fast senkrecht ab. Die Mittelbrust ist mit Zähnchen versehen, das Abdomen kräftig punktiert. Die Beine sind kurz, die Schienen haben die normalen drei Kielchen.

Länge, 4.8 bis 5.3 Millimeter; Breite, 3 bis 3.2 Millimeter.

Mir liegen 23 Exemplare vor, in den Sammlungen Berlin, Stettin, München, Leyden, Sarawak, und Gebien.

Borneo, Kuching, 22 October, 1898 (*Moulton*). Java, Toegoe (*J. D. Pasteur*). Ceylon, Colombo (*Nietner*). Himalaya.

Diese kleine Art ist dem *B. cornutus* Fabricius sehr ähnlich, aber durch die Bildung des Halsschildes beim Männchen und Weibchen verschieden; es fehlen die grossen Höcker auf der Mitte der Scheibe, und an der Basis fehlt der grosse, halbkreisförmige Ausschnitt, ferner haben die Flügeldecken nicht sechs Haupthöcker, sondern ziemlich gleichmässige, längliche, kammähnliche kleine Erhabenheiten. Die nächst verwandte Art ist aber *B. niponicus* Lewis aus Japan, von der sie sich wenig unterscheidet, die Hörner des Männchens sind aber länger und von der Seite gesehen mit der Spitze nicht nach vorn gerichtet, die Seitenzähne des Pronotums sind bei *niponicus* vorn nicht gleichmässig, sondern hinter den ersten findet sich eine seichte Ausbuchtung, die grossen Tuberkeln der Flügeldecken sind etwas kleiner, nicht in die Länge gezogen, und an der Basis jederseits des Schildchens fehlt der dreizackige kleine Kamm.

Die Beschreibung dieser Art ist mir erst 1920 zugegangen. Ich hatte daher die Art als neu beschrieben und sie unter dem Namen *contemptus* in den Sammlungen verbreitet.

Byrsax cornutus Fabricius. Tafel 1, Fig. 5 und 8.

Byrsax cornutus FABRICIUS, Ent. Syst. 1 (1792) 88; Systema Eleutheratorum, 8°, Kiel (1801) 112 (sub Trox); GEBIEN, Deutsche Ent. Zeitschr. (1906) 218.

Byrsax horridus OLIVIER, Entomologie ou histoire naturelle des insectes. Coléoptéres No. 55 3 (1795) 5; LATREILLE, Hist. Nat. Crust. Ins. 10 (1804) 312; WALKER, Ann. Mag. Nat. Hist. III 2 (1858) 284.

Byrsax tuberculifer MOTSCHULSKY, Bull. Soc. Imp. Nat. Mosc. II 36 (1863) 476.

Byrsax horridus (*Asida horrida* Walker) wurde bisher als eigene Art mit *B. tuberculifer* als Synonym aufgeführt. Mir haben zwar die Typen nicht vorgelegen, ich zweifle aber keinen Augenblick dass die Beschreibungen auf unsere Art bezogen werden müssen. Auch im Berliner Museum ist sie als Synonym zu *cornutus* aufgestellt. Sie ist auf Ceylon anscheinend nicht selten.

Byrsax cornutus ist dem *B. excisicollis* am nächsten verwandt, beide haben den halbkreisförmigen Ausschnitt an der Basis des Pronotums, jederseits der Mitte, der Rand des Körpers ist bei beiden Arten fast fingerförmig gezähnt, aber bei unserer Art sind die Randkörnchen der Decken auf die Zähne gerückt, bei *excisicollis* stehen sie entfernt am Grunde, die Haupttuberkel der Decken liegt am Absturz und ist quer bei *cornutus*, bei der andern Art konisch. Beim Männchen ist das Pronotum nicht wie bei *excisicollis* in zwei spitze Zähne nach vorn ausgezogen. Habituell sehr ähnlich ist *B. niponicus* Lewis, aber flacher, die Flügeldecken haben keine Höcker bei der japanischen Art, nur grosse Körner, ebenso ist der Halsschild nur grob und weitläufig granuliert und in beiden Geschlechtern vorn nicht kapuzenförmig vorgezogen, sondern einfach gerade abfallend, grosse Höcker auf der Scheibe fehlen, an der Basis fehlt der halbkreisförmige Ausschnitt, statt dessen ist der letzte der Seitenrandzähne durch einen kleinen, schlitzförmigen Ausschnitt von den andern abgesetzt.

[redacted]

Sechs und zwanzig Exemplare in den Sammlungen Berlin, Dahlem, München, Dresden, Stettin, und Gebien.

Ceylon, Colombo. Indien. Coromandel, Pondicherry. ? Sumatra (*Morton* leg.).

Ob der Fundort Sumatra für einige Exemplare meiner Sammlung richtig ist muss ich bezweifeln, da die Art mir aus andern Quellen von dort nicht vorliegt. Auch habe ich Tenebrioniden die Morton auf Ceylon sammelte.

Byrsax excisicollis Gebien.

Byrsax excisicollis GEBIEN, Saraw. Mus. Journ. No. 5 2 (1914) 9, t. 1, f. 6.

Die Art ist an anderen Orten genau beschrieben, doch ist die Beschreibung des Männchens hinzuzufügen, denn ich hielt, da das geringe mir vorliegende Material eine Untersuchung der Geschlechtsorgane nicht gestattete, ein wohlentwickeltes Weibchen für ein Männchen. Nun liegt mir die Art in Anzahl in beiden Geschlechtern von verschiedenen Fundorten vor, so dass die Beschreibung des Männchens nachzuholen ist.

Kopf mit Hörnern, die aber verhältnismässig klein sind, fast gerade, am Ende nicht verbreitert, sie liegen dem Kopf ziemlich stark an, ihre Aussenkante ist kräftig gezähnt; die Hörner sind bei schlecht entwickelten Männchen kurz kegelförmig. Auch beim Männchen ist der Vorderrand des Pronotums zweizähnig, aber schwächer als beim Weibchen.

Vier und zwanzig Exemplare in den Sammlungen Berlin, Stettin, Dresden, Hamburg, München, Leyden, Sarawak, und Gebien.

Länge, 6.5 bis 10.2 Millimeter (inclusiv der vorderen Hörner des Pronotums).

Malacca. Sumatra, Tandjong Morawa in Serdang (*Dr. B. Hagen*). Java (*Blume*), Buitenzorg, 24 Februar bis 12 März, 1904 (*K. Kraepelin*). Borneo, Kuching, 4 October, 1898, 31 Mai, 1900 (*Moulton*).

Byrsax prolifericornis sp. nov. Tafel 1, Fig. 1.

Ziemlich klein, oval, an den Seiten etwas parallel.

Männchen.—Kopf mit zwei stark nach vorn gerichteten, nach dem Ende zu verflachten, oben krenulierten Hörnern, die an der Spitze gerade abgeschnitten sind und eine leicht nach aussen gerichtete Spitze haben; am Grunde innen zeigt sich eine leichte, lange Schwellung auf der Stirn. Umittelbar unter dem Vorderrand des Pronotums finden sich zwei eng aneinander stehende, zitzenartige Warzen. An den Fühlern ist Glied 4 innen rundlich ausgezogen, ungefähr so lang wie breit, die folgenden Glieder werden immer stärker quer, sie sind innen zahnförmig, das vorletzte ist doppelt so breit wie lang, das letzte so breit wie lang.

Der Halsschild hat sehr stark gerundete, breit verflachte Seiten, die grobe fingerartige Zähne tragen. Den spitzen Vorderecken gegenüber liegt der Endzahn, neben dem sich ein tiefer schlitzartiger Einschnitt befindet, der innen von einem Zahn an der Basis begrenzt wird, weiter nach der Mitte hin ist wieder ein kleiner Ausschnitt. Die Randzähne tragen keine Körnchen, die Verflachung ist von der sehr stark buckeligen Scheibe nicht durch eine Punktreihe abgesetzt, es findet sich nur in der Mitte ein tiefer, lochartiger Punkt. Am Vorderrand erheben sich dicht nebeneinander nach vorn gerichtete zwei eigenartig gestaltete Hörner, sie laufen innen in der ersten Hälfte nebeneinander parallel, ihre Spitze ist lang, hakenförmig nach unten und aussen gerichtet, oben tragen sie zwei bis drei starke Zähne, alle Spitzen sind fein beborstet. Die Scheibe ist stark tuberkuliert, die Körner sind spitzig, fast dornförmig, unregelmässig gestellt; jederseits der Mitte hinten stehen vier Körner im Bogen, von denen die beiden hinteren nebeneinander stehen. Der Vorderrand ist innen neben den Vorderecken mit zwei spitzen Zähnchen versehen, von denen der äussere durch einen feinen, tiefen Einschnitt von der Vorderecke getrennt ist. Der Grund ist fein punktiert.

Die Flügeldecken sind an der Basis neben dem Schildchen stark stumpf gezähnt, der Seitenrand hat ziemlich feine, aber etwas fingerartige Zähne, die oben keine Körner haben, auch etwas entfernt vom Seitenrande finden sich keine Körnerreihe. Die Scheibe ist von den verflachten Seiten durch eine Reihe grober, lochartiger Punkte abgesetzt, sie hat neben der Naht eine Reihe von drei etwas länglichen Höckern, von denen der letzte nicht grösser ist, weiter nach aussen stehen drei weitere, ebenso grosse, von denen nur der mittlere kleiner ist, auch die Schulterbeule ist stark entwickelt, im übrigen finden sich kräftige Körner und sehr unordentliche Reihen von tiefen Punkten.

Das Prosternum ist hoch gekielt und fällt vorn senkrecht ab. Die Tarsen sind von der eigentümlichen Bildung wie bei den andern Arten, so dass die vorderen und mittleren scheinbar 4-gliedrig sind, die mittleren Glieder sind stark schräg abgeschnitten.

Länge, 6 Millimeter; Breite, 4.5.

Ein Männchen von Borneo, Kuching, 19 October, 1898 (*Moulton*), in meiner Sammlung aus dem Sarawak Museum.

Diese ausgezeichnete Art ist mit keiner andern zu verwechseln, die Hornbildung auf dem Pronotum findet bei den Tenebrioniden kein Seitenstück.

Byrsax ovipennis sp. nov.

Klein, sehr hoch gewölbt, in der Mitte etwas parallelseitig, hellbraun glänzend. Reste des Wirtspilzes gelbbraun.

Der Kopf hat keine mittlere Längsfurche, die Wangen sind scharfwinklig abgesetzt, aber nicht eigentlich gezähnt, auch weiter nach vorn fehlt jegliches Zähnchen. Auf der Stirn stehen beim Männchen einige kräftige runde Körner und zwei tuberkelähnliche Augenfalten, die in die Hörner übergehen, diese sind kurz, flach, dick, zur Fläche des Kopfes wenig nach hinten geneigt, am verbreiterten Ende gezackt. Die Fühler haben die gewöhnliche 7-gliedrige Keule, Glied 4 ist so breit wie lang, nicht dreieckig, verrundet, die folgenden sind immer stärker quer, die vorletzten nicht abgestutzt, das letzte ist viel länger als breit.

Der Halsschild ist an den Seiten breit verflacht, ganz hinten am breitesten, der Rand ist stark gesägt, die Zähne sind kurz fingerartig, an der Basis findet sich jederseits ein schräger, schlitzartiger Ausschnitt, welcher nach innen von einem zungenförmigen Lappen begrenzt wird, der wie der Schlitz schräg nach aussen gerichtet ist, weiter nach innen, in der basalen Randfurche, findet sich ein lochartiger Einstich und ein noch tieferer am seitlichen Absturz der Scheibe, die Verflachung begrenzend, die Randzähne sind nicht ganz flach, tragen aber keine deutlichen Körner, dagegen finden sich auf der Scheibe stark erhabene Körner, zwei kurze, zapfenartige Tuberkelpaare finden sich in und hinter der Mitte.

Die Flügeldecken haben einen fast senkrechten seitlichen Abfall, die Seiten sind breit verflacht, aber nicht schräge, sondern setzen in ihrer Richtung den Absturz der Scheibe fast fort, der Rand ist wesentlich schmäler als die Scheibe, beim Männchen vorn parallel und so breit wie die Basis des Pronotums, beim Weibchen aber nach vorn eingezogen, daher der Umriss der Decken eiförmig, die Basis der Verflachung vorn ist glattrandig, die Ecken sind kurz rechtwinklig, die Zähnelung ist fingerartig, dicht, oben fehlen aber auf den Zähnen eigentliche Körner, die Zacken sind nur oben etwas dicker und sehr fein rauh, auch im übrigen fehlen Körner auf dem Rand. Die Scheibe ist hoch erhaben und jederseits der Naht mit drei starken Höckern versehen, die etwas länglich sind, besonders der erste, der oben fünf oder sechs kleine Zähnchen hat. Der hinterste Buckel ist nicht quer, an den Seiten der Hauptreihe finden sich einige verschieden starke Tuberkeln. Die Punktreihen sind undeutlich, ihre Punkte sind grob und tief, die Randreihe ist nicht deutlich tiefer.

Das Prosternum ist auch am vorderen Absturz leicht gekielt, das Mesosternum auffallend flach, ungekielt und ohne Zapfen, die Schienen haben keine deutlichen Kiele.

Länge, 5.2 bis 5.5 Millimeter; Breite, 3.7 bis 3.8.

Ein Männchen, 2 Weibchen, im Museum Berlin, von denen mir ein Weibchen für meine Sammlung überlassen wurde.

Ceylon (*Nietner*).

Die Art sieht auf den ersten Blick dem *B. cornutus* ähnlich, ist aber kleiner, es fehlen die hohen Höcker des Pronotums, die Flanken der Decken fallen fast senkrecht ab, die Zähnelung ist feiner, und die einzelnen Zähne haben nicht wie bei dieser Art scharfe Körnchen, ferner fehlt der halbkreisförmige Ausschnitt der Halsschildbasis, statt seiner findet sich mehr nach den Seiten hin ein tiefer Schlitz, begrenzt von einem langen, zungenförmigen Lappen, ferner ist die Mittelbrust nicht gekielt, ebenso fehlen deutliche Kiele auf den Schienen. Etwas näher steht *B. tuberculatus,* dem gleichfalls der halbkreisförmige Ausschnitt der Halsschildbasis fehlt, aber er hat nicht das Doppelpaar zapfenförmige Erhabenheiten auf dem Pronotum und die Zunge neben dem Schlitz fehlt, die Verflachung auf dem Pronotum und den Flügeldecken hat grobe Körner, und auf den Decken fehlen die drei Haupthöcker, ferner hat das Mesosternum einen Kiel mit vorderem langen Zapfen.

Byrsax singhalus sp. nov. Tafel 1, Fig. 6.

Breit elliptisch, in der Mitte parallelseitig, von der Gestalt des *B. cornutus,* nach Reinigung glänzend schwarzbraun.

Der Kopf ist sehr stark geneigt, hängend, breit, flach, auf der Stirn mit kurzer Längsfurche versehen, die hinten tiefer ist; er ist in beiden Geschlechtern recht verschieden, beim Männchen mit zwei kurzen, dicken, parallelseitigen, oben schräg abgestutzten, kaum gebogenen Hörnern versehen, die nach hinten geneigt sind und nicht weit von der Kopffläche abstehen, von oben gesehen jedoch erscheinen sie nach vorn gerichtet wegen der starken Neigung des Kopfes. Die Hörner sind besonders oben verflacht, aber nicht verbreitert, hinten leicht krenuliert. Am Innenrand der Augen, zwischen ihnen und den Hörnern, findet sich eine konische, scharfe Tuberkel. Die Wangen sind etwas breiter als die Augen, scharf gewinkelt, der Aussenrand ist S-förmig gekrümmt, der Vorderkopf vor ihnen ebenfalls mit schwach S-förmiger Kurve. Das Epistom ist schwach gewölbt, die Punktierung ist kräftig, ziemlich dicht, aber nirgend gedrängt. Beim Weibchen fehlen die Hörner, von den Tuberkeln am Innenrand der Augen findet sich nur eine Spur, die Wangen sind schmäler als die Augen, nicht gewinkelt und sehr schmal, fast fehlend, so dass der Vorderrand des Kopfes von Auge zu Auge einen mehrfach gewellten Bogen bildet. Bei beiden Geschlechtern ist der Clypeus durch eine feine, ziemlich scharfe Querfurche abgesetzt, die beim Männchen hinter den Hörnern liegt. Die Fühler haben eine stark abgesetzte 7-gliedrige Keule, von der die vorletzten Glieder sehr stark quer sind, am Innenende abgeschnitten, nicht zugespitzt, etwas schief, Glied 4 ist dreieckig, so breit wie lang, auch das letzte ist nicht länger als breit. Der Unterkopf hat keine bemerkenswerten Eigentümlichkeiten.

Das Pronotum ist in beiden Geschlechtern gleich gebildet, es hat breit verflachte Seiten, ist weit hinter der Mitte am breitesten, der Rand ist kräftig gezackt, die Zacken sind ungefähr rechtwinklig, am Hinterrand der Verflachung noch spitzer, eine Reihe weniger Körner begleitet den Rand, weit entfernt von der Kante. Die Vorderecken ragen vor, sind aber in der Kante scharf stumpfwinklig. Der Vorderrand ist nicht gezähnt, sondern leicht bogig vorgezogen, der Rand selbst gekörnt. Die Scheibe ist buckelig gewölbt; es findet sich in der Mitte eine feine Doppeltuberkel, dahinter zwei ganz eng aneinander gedrängte Höckerchen, der Raum vor diesen Höckern ist oval, flach, einfach punktiert. Die verflachten Seiten sind von der Scheibe nicht durch ein Grübchen abgesetzt, ein solcher findet sich aber an der Basis, deren Mittelteil von den Flanken absetzend, der Basalrand zeigt keinen Ausschnitt.

Die Flügeldecken haben genau die Breite der Pronotumbasis, der Seitenrand ist nur schmal verflacht, ähnlich wie bei *excisicollis* und *cornutus,* die Verflachung ist abwärts gerichtet, der Rand leicht gezähnt, die Zähnchen an der Spitze verrundet, etwas stärker als bei *gibbifer,* aber viel schwächer als bei *cornutus,* jedes Zähnchen am Grunde mit flachem, etwas länglichen Körnchen, eine zweite Reihe, entfernt vom Rande, fehlt, die Basis des verflachten Randes ist ungezähnt, neben den Schulterecken nicht eingezogen, die Schultern sind daher stumpfwinklig. Die Scheibe der Decken ist sehr stark erhaben, so dass ihre Seiten fast senkrecht abfallen, die Basis ist jederseits neben dem Schildchen zahnförmig vorgezogen. Jede Decke hat neben der Naht drei hohe Buckel, von denen der letzte nicht niedriger ist, diese Höcker haben einen schmalen Kamm, nach aussen hin befindet sich am Absturz jedes Buckels ein Nebenhöcker, die Schultern sind ebenfalls gebuckelt. Es sind undeutliche Reihen grober Punkte vorhanden, deren Zwischenräume mit eizelnen kräftigen Körnern versehen sind, die letzte Punktreihe ist nicht auffällig gröber als die andern.

Das Prosternum hat nur von den Hüften an nach hinten einen scharfen schmalen Kiel und ist vorn vollständig flach. Das Mesosternum zeigt den gewöhnlichen erhabenen Kiel, der eine Doppeltuberkel hat, von denen die vordere nicht lang zapfenförmig ist. Das Abdomen ist zeimlich grob und dicht punktiert, jedes Segment vorn mit einer Reihe grober Punkte, die Schienen mit scharfem Doppelkiel.

Länge, 7.3 bis 8.2 Millimeter; Breite, 5.1 bis 6, ohne Hörner.

Ceylon (*Nietner*), ohne genauere Angabe, in den Sammlungen Berlin, Stettin, München, Dresden, und Gebien.

Fünf Männchen, 13 Weibchen. Diese Art ist in mehrfacher Beziehung interessant, sie verbindet mit der Körperform der *cornutus*-Gruppe die meisten Merkmale der Arten um *gibbifer.* Auf den ersten Blick ähnelt sie dem *B. excisicollis* von Sumatra, hat ähnliche Höckerbildung, es fehlen aber die Ausschnitte des Pronotums und die vordere Protuberanz, ferner ist der Seitenrand des Körpers sehr fein gesägt. Gleiche Merkmale trennen sie von *cornutus,* der überdies viel kleiner ist und einen queren Endhöcker der Decken hat. *Byrsax gibbifer* und Verwandte sind fast kreisförmig, haben ganz andere Hornbildung des Männchens, einen zwar buckelig gewölbten, aber nicht gehöckerten Halsschild, auch ist der letzte Höcker der Decken viel kleiner als die andern, bei unserer Art aber nicht, ferner ist die Körperform eine andere.

Es ist möglich, dass diese Art *B. horridus* von Olivier und Walker ist. Ich habe aber *horridus* in Uebereinstimmung mit den Sammlungen Berlin und München (Haag-Rutenberg) als Synonym von *B. cornutus* angesehen.

Byrsax satanas Gebien.

Byrsax satanas GEBIEN, Philip. Journ. Sci. § D 8 (1913) 381.

Der ausführlichen Beschreibung dieser Art habe ich umsoweniger hinzuzufügen, als die Verwandtschaftsbeziehungen zwischen ihr und den andern Arten in der neuen Tabelle auseinandergesetzt sind.

Byrsax gibbifer Wesmael. Tafel 1, Fig. 2, 3, 4, und 9.

Byrsax gibbifer WESMAEL, Bull. Acad. Brux. 3 (1836) 112, t. 4, f. a–c; GUERIN, Rev. Mag. Zool. (1838) 117; PREUDHOMME DE BORRE, Bull. Acad. Roy. Belg. II No. 4 29 (1870) 379.

Byrsax testudinarius MOTSCHULSKY, Bull. Soc. Imp. Nat. Mosc. II 36 (1863) 477, t. 9, f. 30.

Byrsax coenosus PASCOE (Weibchen), Journ. Ent. 1 (1860–62) 42, t. 3, f. 7.

Byrsax coenosus var. *4-nodosus* GEBIEN, Saraw. Mus. Journ. No. 5 2 (1914) 9, t. 1, f. 6.

Da die Beschreibungen dieser Art entweder ganz ungenügend sind, oder aber in schwer zugänglichen Zeitschriften sich finden, meist auch nur ein Geschlecht berücksichtigen, gebe ich eine neue Beschreibung, welche unter Berücksichtigung der andern Arten erfolgt.

Glänzend dunkelbraun, aber fast immer mit den matt gelbbraunen Resten des Wirtspilzes besetzt, die sich trocken meist mit einer Nadel abheben lassen.

Kopf beim Männchen mit zwei starken Hörnern, die schräg nach vorn und aussen gerichtet sind, aber von der Kopffläche nicht senkrecht abstehen, sie sind zur Spitze wieder einwärts gekrümmt, verflacht und verbreitert, und dort an der Aussenseite deutlich krenuliert. Die Wangen sind zahnförmig, scharf gewinkelt, und teilen das Auge kaum bis zu einem Drittel. Ein weiteres Zähnchen liegt innen von den Wangen am Ende des fast gerade abgestutzten Epistoms. Am Grunde zwischen den Hörnern ist die fein eingeschnittene Clypealsutur. Die Punktierung ist fein und dicht, lässt aber in der Mitte jederseits eine blanke Stelle frei. Hinter den Hörnern findet sich jederseits ein rundes Körnchen und am Grunde eine kleine, kurze Augenfalte, welche innen die Augen einengt. Beim Weibchen fehlen die Hörner, doch ist der Clypeus unterbrochen leistenförmig erhaben, die Wangenecke ist verrundet.

Der Halsschild hat ausserordentlich breit verflachte, schwach gesenkte Seitenflächen, die Seiten sind in sehr starkem Bogen gekrümmt, der Rand selbst ist mit circa fünfzehn schwach stumpfwinkligen Zähnchen versehen. Ziemlich weit vom Rande entfernt, aber diesem gleichaufend, findet sich eine Serie runder Körnchen. Die hochgebuckelte Scheibe ist von den Seiten durch eine schräge, von hinten her bis über die Mitte reichende, flache Furche abgesetzt, oben unregelmässig gekörnt, sehr fein und nicht sehr eng punktiert. Der Hinterrand hat jederseits an der Basis nur einen schwachen bogigen Ausschnitt. Beim Weibchen dieser Art und einiger verwandten findet sich eines der seltenen Beispiele von positiven Geschlechtsmerkmalen, da der Vorderrand zwei wagerechte, nach vorn gerichtete, spitz dreieckige Hörner hat, die dem Männchen fehlen.

Die Flügeldecken haben sechs grosse Buckel, von denen der vorderste der grösste ist, er ist stark erhaben, sehr breit, und reicht von der Schulter bis zum zweiten Streif schräg nach hinten, dieser erste ist mehr spitzig, dahinter liegen zwei weitere Höcker, von denen der hintere der kleinere ist, die äusseren Zwischenräume haben eine Reihe von sehr weitläufigen Körnchen, die Punktreihen sind ziemlich grob, sehr grob und tief ist die Randreihe. Der stark verbreiterte Rand ist schwach querfaltig, schwach winklig gesägt und hat zwei Reihen von Körnern, die dem Rand gleichlaufen, die äussere steht auf den Zähnchen des Randes.

Das Prosternum ist vorn ganz stumpf und undeutlich gekielt, hinten niedergebogen, das Mesosternum hat ein ziemlich spitzes, abgesetztes, aufragendes Zähnchen; die Schienen sind scharf gekielt, die Kiele undeutlich behaart.

Länge, 6.3 bis 10 Millimeter. Mir liegen 126 Exemplare vor.

Malacca. Singapore. (Nach Exemplaren der Sammlung ex coll. Felsche auch von Ceylon; Mus. München von Ostindien). Sumatra, Tebing-tinggi, 2 bis 17 Januar, 1885 (*Schultheiss*); Soekaranda, Januar, 1894 (*Dohrn*); Liangagas (*Dohrn*); Tandjong-Morawa, Serdang (*Hagen*); Manna (*Knappert*). Java (*Blume*), ohne genauere Angaben. Borneo, Kuching, 29 Dezember, 1898, 10 November, 1898; 15 Dezember, 1898 (*Moulton*). In fast allen Sammlungen.

Mit der Grösse schwanken auch die sekundären Geschlechtsmerkmale. Kleine Tiere (var. *4-nodosus* Gebien) haben nur vier Haupthöcker auf den Decken, die Kopfhörner sind klein, am Ende stumpf und nicht verbreitert, beim Weibchen werden die Hörner des Pronotums immer schwächer, bis sie bei den kleinsten Tieren zuletzt ganz schwinden. Die nächstverwandte Art ist *B. satanas* von den Philippinen, welche sich durch andere Hörner des Männchens leicht unterscheidet, sie liegen erst dem Kopf flach an und sind dann nach vorn und zur Seite geschwungen, nicht verbreitert, der ganze Körper ist bei unserer Art viel breiter, nicht viel länger als breit, der Rand der Decken ist halb so breit wie der Diskus, bei *satanas* nur ein Drittel so breit, ferner ist bei diesser Art die Zähnelung stärker, die Zähne sind ungefähr rechtwinklig, der Kopf ist granuliert, nicht punktiert, die beim Weibchen von *gibbifer* vorhandenen scharfen Vorderrandzähne des Pronotums fehlen bei *satanas*.

Noch näher steht die folgende Art, bei welcher die Unterschiede angegeben sind.

Byrsax confrater sp. nov.

Von fast kreisförmigem Umriss, schwarzbraun glänzend. Der Kopf ist flach ausgehöhlt und hinten ziemlich scharfkantig vom Nacken abgesetzt, diese Kante aber nur bei etwas abgerücktem Kopf sichtbar, die Stirn mit leichter Längsfurche, am Innenrande der Augen steht eine kleine Tuberkel (beim Männchen am Grunde des Hornes, beim Weibchen nur eine schwache Falte bildend). Die Wangen haben Augenbreite, sie sind scharfzähnig, das Ende ist rechtwinklig abgeschnitten, ihr Vorderrand ist dem des Auges zuerst parallel, die Ecken des gerade abgestutzten Epistoms ragen ebenfalls zahnförmig vor, es ist beim Weibchen deutlich gewulstet. Die Punktierung ist ziemlich grob, fehlt aber beim Männchen jederseits hinter den Hörnern. Diese sind sehr verschieden entwicklet, bei schwachen Männchen ziemlich kurz, dünn, nicht senkrecht aufgesetzt, sondern mit spitzem Winkel hinten vom Kopf abstehend, sie sind nur wenig verflacht, mässig zugespitzt, aussen krenuliert und nur in einer Ebene gebogen, von vorn gesehen bilden die Hörner fast einen Kreis. Bei wohlentwickelten Männchen ist eine doppelte Krümmung vorhanden, bei ihnen sind die Hörner fast so lang wie der Hinterkörper, von der Seite gesehen sind die Spitzen in der Endhälfte stark nach vorn gezogen. Die Fühler sind beim Männchen in den ersten Gliedern sehr schlank, Glied 3 ist kaum länger als 4, dieses fast zylindrisch, doppelt so lang wie dick, 5 ist dreieckig, die folgenden immer stärker quer, innen spitz, nicht scharf abgeschnitten, das letzte Glied ist so breit wie lang; beim Weibchen ist Glied 4 etwas kürzer.

Das Pronotum ist ganz ähnlich gestaltet wie bei *gibbifer*, mit sehr breit und sehr stark verflachten Seiten versehen, die Ränder sind scharf stumpfwinklig gezähnt, nicht eigentlich gezackt, die Basis hat keinen Ausschnitt, sondern nur jederseits beim Beginn des Randes ein tiefes Punktgrübchen; jedes Zähnchen trägt oben ein winziges Körnchen, eine zweite Reihe begleitet den Rand bis zur Basis, entfernt von der Kante, ausserdem zeigen sich noch einige zerstreute Körnchen. Die Scheibe ist stark gebuckelt, aber nicht spitz oder zahnförmig gehöckert, doch unregelmässig gekörnt, beim Männchen vorn gerade abgestutzt, beim Weibchen mit zwei kleinen, rundlichen Protuberanzen. Am Grunde der Scheibe, an den Seiten, befindet sich unten, etwa in der Mitte, eine tiefe, lochartige Grube, die Vorderecken sind fast verrundet, stark stumpfwinklig.

Die Flügeldecken sind sehr breit, auch beim Weibchen in der Basalhälfte parallel, von der Breite der Halsschildbasis, der Rand ist sehr breit verflacht abgesetzt, an der Basis so breit wie die Scheibe, der Rand wird durch eine Reihe lochartiger Punkte begrenzt, die Kante ist sehr fein stumpf gesägt (wie bei *gibbifer*), jedes Zähnchen mit winzigem Körnchen, eine weitere Reihe steht etwas entfernt vom Rand, die Basis neben den Schultern ist nicht gesägt, die Basalecken sehr kurz verrundet rechtwinklig. Es sind drei Hauptbuckel vorhanden, von denen der letzte der kleinste ist, auch die Basis ist ähnlich wie bei *gibbifer* gebuckelt. Die groben Punkte stehen in unordentlichen Reihen, deren Zwischenräume hin und wieder Körnchen zeigen.

Das Prosternum ist auch am vorderen Absturz deutlich gekielt, das Mesosternum ist nich gekielt, sondern wie bei der verwandten Art vorn mit langem, dünnen, abstehenden Zapfen versehen. Die Schienen sind nicht gekielt.

Länge, 6 bis 10 Millimeter; Breite, 5.1 bis 8.

Vierzehn Männchen; 8 Weibchen von Ceylon (*Nietner*), in den Sammlungen Berlin, Stettin, München, Dresden, und Gebien.

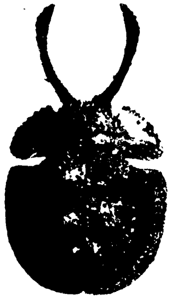
Diese Art ist am nächsten mit *B. gibbifer* verwandt, der häufigen Art der Sunda-Inseln und von Hinterindien, sie unterscheidet sich nicht wesentlich von ihr und kann fast als westliche Unterart angesehen werden. Doch sind die Hörner des Männchens viel dünner, am Ende verbreitert und in anderer Richtung nach vorn gebogen, beim Weibchen finden sich nicht die beiden scharfen Spitzen am Pronotum, sondern nur zwei rundliche Vorragungen.

ILLUSTRATION

TAFEL 1

FIG. 1. *Byrsax prolifericornis* sp. nov. Männchen, 5 ×.
2. *Byrsax gibbifer* Wesmael, Männchen, 4 ×.
3. *Byrsax gibbifer* Wesmael, Weibchen, 4 ×.
4. *Byrsax gibbifer* Wesmael, Männchen, 4 ×.
5. *Byrsax cornutus* Fabricius, Männchen, 5 ×.
6. *Byrsax singhalus* sp. nov. Männchen, 5 ×.
7. *Byrsax tuberculatus* Gravely; Pronotum.
8. *Byrsax cornutus* Fabricius; Pronotum.
9. *Byrsax gibbifer* Wesmael, Männchen; Pronotum.

1



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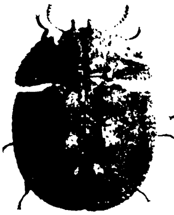

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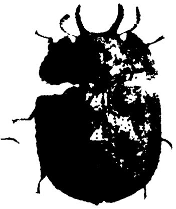

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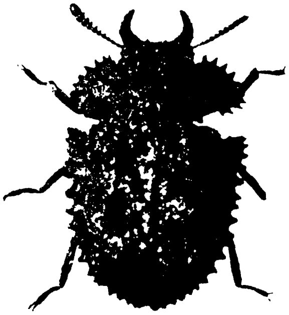

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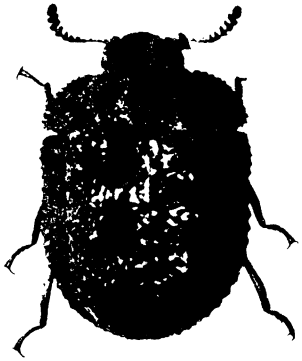

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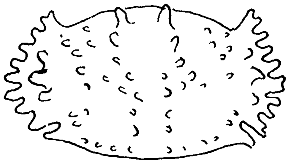

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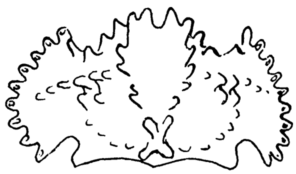

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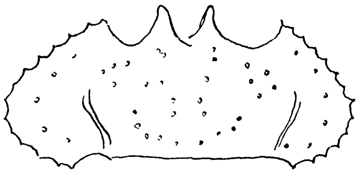

9

TAFEL 1.

UNIV. OF MICH.

ADDITIONS TO THE HERPETOLÓGICAL FAUNA OF THE PHILIPPINES, IV

By EDWARD H. TAYLOR

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This paper is the fourth[1] of a series of papers supplemental to my monographs on the herpetological fauna of the Philippines. It is based on my own collections, made chiefly in 1923. The principal collections of the year were made in Benguet Subprovince and Laguna Province, Luzon; Tablas; Cotabato Province, Mindanao; Busuanga; and Palawan.

For the Cotabato trip I am under deepest obligations to Mr. E. H. Pagenhart, director of the Coast and Geodetic Survey in the Philippines, and to Capt. F. G. Engle of the U. S. S. *Pathfinder* for permission to accompany the ship while it was engaged in coast and geodetic work in the waters of Celebes Sea along the southern coast of Mindanao. I was with the ship for nearly two and one-half months, traveling from a point on the coast near the small island Tatayan to Sarangani Bay, and made daily landings. Captain Engle was tireless in his courtesies, both in furnishing transportation and in assisting my work in every way possible, even to the extent of personally collecting numerous specimens which he very kindly presented to me. I am also very greatly indebted to the other officers of the boat, particularly Lieutenant Eickelberg, Lieutenant Horne, and Lieutenant Riggs, for numerous courtesies and for many specimens.

For the collections at Baguio, Benguet Subprovince, and the extended trip to Palawan I am under deep obligation to Dr. John Dutton Wright, an educator and philanthropist of New York City and Santa Barbara, California. Doctor Wright furnished funds to defray a large part of the expenses of both trips and manifested keen interest in the collections.

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[1] Additions to the herpetological fauna of the Philippines, I, Philip. Journn. Sci. 21 (1922) 161–206, pls. 1–7; II, ibid., 21 (1922) 257–303, pls. 1–4; III, ibid., 22 (1923) 515–557, pls. 1–3.

By far the largest collections were made on the Cotabato coast of Mindanao, and the number of novelties was comparatively large. Unfortunately, I was unable to make the ascent of any high mountains in this region, where doutbless many unknown forms await discovery.

At Saub, a small settlement on the property of the Celebes Plantation Company, I found an extraordinary concentration of the faunas of this part of Mindanao. The original forest was being felled for the planting of coconuts and night collecting in the recently felled trees yielded very remarkable results. From a single huge tree recently felled, a tree covered with climbing arums and filled with a large assortment of ferns and orchids, I obtained the following: Two species of frogs representing two genera, one the rare *Hazelia spinosa* Taylor; eleven species of lizards representing seven genera, and including the rare *Lepidodactylus planicaudus* Stejneger, *L. aureolineatus* Taylor, a new species of *Pseudogekko,* and *Luperosaurus joloensis* Taylor; and five species of snakes representing three genera, one of which is the rare *Dryocalamus mccroryi* Taylor; making the astonishing total of eighteen species, representing twelve genera, and a total of one hundred twenty-nine specimens! In the small field of felled forest, an area not exceeding 5 hectares, the following totals were taken: Frogs, ten genera, nineteen species; lizards, seventeen genera, twenty-nine species; snakes, fifteen genera, twenty-one species. Nowhere in my eleven year's collecting in the Philippines have I ever found such a concentration of specimens. Eighteen species of mammals were also taken in the same limited area.

I am under great obligation to Mr. Charles McIlvain, manager of the Celebes Plantation Company, for his untiring courtesy and for many specimens which he himself collected.

The Palawan trip, due to stormy weather and my own illness, was less successful than the Mindanao trip. However, a number of interesting novelties were taken. Collections were made at the following points on Palawan: Brooks Point, Island Bay, Abolan, Iwahig, Thumb Peak, and Puerto Princesa; and on Dumaran, Culion, and Busuanga Islands.

One of the most interesting results of the collecting was the capture of many specimens representing genera hitherto not recorded in the Palawan group; namely, *Kaloula, Nectophryne, Gymnodactylus, Riopa, Siaphos, Sphenomorphus, Insulasaurus* (a new genus described in this paper), *Typhlops,* and a new genus of discoglossid toads from Busuanga Island.

In this paper I also list *Dryophiops rubescens* (Gray), which is the first record for both genus and species for the Palawan group. Thus, ten new authentic records of genera for the Palawan group resulted from the collecting trip. I also describe in this paper a new species of *Holarchus* from Culion Island, discovered by Dr. Granville A. Perkins. This is the first record of this genus of the Palawan group.

In this paper the following species are described:

Gekko palawanensis sp. nov.
Mabuya englei sp. nov.
Insulasaurus wrighti g. et sp. nov.
Brachymeles pathfinderi sp. nov.
Brachymeles wrighti sp. nov.
Holarchus perkinsi sp. nov.
Holarchus maculatus Taylor.
Dryophiops rubescens (Gray).

LIZARDS

Gekko palawanensis sp. nov.

Type.—No. 1467, E. H. Taylor third collection; collected on Thumb Peak, Palawan, October 23, 1923, by E. H. Taylor.

Description of type.—Rostral moderate, entering nostril, having a deep indentation above with two small sutures entering the scale, partially inclosing the anterior of two small rounding scales which separate the supranasals; two equal-sized postnasals, a supranasal, and the first labial also border nostril; the granular scales on head small, about half as large as in *Gekko monarchus* (Duméril and Bibron) and more uniform in size, there being twenty-one scales in a line from eye to nostril, while in *G. monarchus* there are usually ten or eleven; the scales are much smaller in the interorbital region, there being forty-three in a line between eyes, while in *G. monarchus* the average number is about thirty; enlarged tubercles on head and on occipital region wanting; fourteen upper labials, which are followed by nine granular scales, border upper margin of mouth; eleven to twelve lower labials, followed by five or six granular scales, border lower margin of mouth; mental small, touching two elongate chin shields; latter in contact with only one labial, being separated from the following labials by two or three enlarged rounding scales; granules on chin and throat much smaller than those on belly; granular scales on body nearly uniform in size, larger proportionally than in *G. monarchus;* eight or nine irregular rows of small indistinct tubercles on back and sides (in *Gekko monarchus* there are twenty-two to twenty-four rows of tubercular scales); a ventrolateral skin fold present bearing no tubercles; thirty-six rows of scales across belly, counting from base of skin fold; a continuous arched line of sixty-six preanal and femoral scales (pore scales in the male); annulations of tail at base marked by a few flat tubercles separated by eleven rows of smaller granules; annulations on distal portion of tail not or but very dimly marked; scales on underside of tail enlarged, usually in two rows; the scales marking annulations larger and frequently coalesced into a single large scale; a single ill-defined tubercle at base of tail; no evidence of a web between digits; toes longer and slenderer than in *G. monarchus;* fifteen or sixteen lamellæ under longest finger, seventeen or eighteen under longest toe; several enlarged scales on palm continuous with the lamellar series on outer toes.

Color in life.—Above mottled lavender-gray with ill-defined darker areas or spots, most prominent of which is a series of seven H-shaped markings along the middle of back, and a W-shaped marking on occiput; tail with irregular blackish annulations; toes barred with cream; belly uniform dull lavender; darker under tail.

Measurements of the type of Gekko palawanensis sp. nov.

	mm.
Total length	133
Snout to vent	60
Tail	73
Width of head	7.5
Width of body	7
Foreleg	25
Longest finger	6
Hind leg	28
Longest toe	7
Diameter of eye	4
Diameter of auricular opening	1.1
Interorbital measurement	7

Variation.—Several specimens of this species taken in the same locality show only insignificant variation. Two male specimens have sixty-five and sixty-eight preanal and femoral pores, respectively.

Remarks.—The present species and *Gekko monarchus* were found to occur in the same immediate localities. Most of the specimens of *Gekko palawanensis* were taken on Thumb Peak, at an elevation of from 300 to 1,000 meters. None was found along the coast or in the forests about the base of the mountain. *Gekko monarchus* was taken in these localities as well as on the mountain. The present species is probably more nearly related to *Gekko mindorensis* Taylor. Many very obvious differences in the number of tubercles, the size, etc., can be noted when the specimens or descriptions are compared. It is highly probable that *G. mindorensis* is confined to Mindoro and the smaller Visayan Islands to the east.

Mabuya englei sp. nov.

Type.—No. 577, E. H. Taylor third collection; collected at Saub, Cotabato Province, Mindanao, April, 1923, by Edward H. Taylor.

Description of type.—Snout rather pointed; rostral visible from above, narrowly touching frontonasal; supranasals narrow, elongate, lying diagonally; frontonasal a little broader than long, touching the anterior frenal; prefrontals widely separated, laterally in contact with two frenals, posteriorly with the first superciliary, first and second supraoculars, and frontal; frontal much longer than wide, separated from first supraocular and in contact only with second; frontoparietals small, touching three supraoculars; parietals more than twice as broad as long, separated by a small interparietal; parietals followed by a pair of nuchals nearly as large and of the same shape as the parietals; nasal single; no postnasal; two frenals, the anterior higher than the nasal; second frenal somewhat lower but much larger than first, nearly rectangular; second frenal followed by two preocular scales and a small scale lying behind lower preocular; four supraoculars, first very small, second very large; five superciliaries; nine upper labials, five anterior and three posterior to large subocular; eight lower labials; mental large; postmental single, touching two labials, followed by two pairs of chin shields, neither pair in contact; temporal elements slightly enlarged; tympanum deeply sunk, the auricular opening rather small, without conspicuous lobules; scales in thirty rows around body, the twelve rows on belly smooth; those on sides and back heavily keeled with six to eight keels, the three median keels most prominent; limbs well developed; digits with smooth lamellæ, nineteen under longest finger, twenty-five under longest toe; anals not or but slightly enlarged; the adpressed hind limb reaches slightly beyond axilla.

Color in life.—Greenish gray above with five dark brownish black stripes on back continuing some distance on tail, the median and the two outer widest; laterally a broad dark stripe begins behind eye and continues to above hind leg, and another more irregular stripe low on side; belly greenish cream; throat bluish; tail grayish with numerous flecks of darker and lighter color; tail below whitish; head olive, labials lighter with small dark spots; legs with a few small irregular spots.

Measurements of the type of Mabuya englei sp. nov.

	mm.
Total length	197
Tail	128
Snout to vent	69
Width of head	12
Width of body	15
Foreleg	22
Hind leg	35

Remarks.—A large series of specimens was taken along the Cotabato coast of Mindanao from Tatayan Island to Saub. These agree with the type in all essential characters. They were taken usually in the low vegetation on the sandy beaches or along the open places along the rivers near their mouths. A few were found in the cultivated areas. None was seen in the forests. Two other species of the genus occur in the same locality; namely, *Mabuya multifasciata* Kuhl and *Mabuya multicarinata* (Gray). No specimens of the other species, *Mabuya rudis* (Boulenger), which occurs in the Zamboanga Peninsula and the Sulu Archipelago, were taken.

The species is well differentiated from the other two species occurring in the same locality. The relationship appears to be closest to *Mabuya rugifera.* From this species it differs in having the frontal touching only a single supraocular, in having four to six more scale rows around the body, more numerous keels on the scales, and a greater number of stripes on the body.

The species is named for Capt. F. G. Engle, of the United States Coast and Geodetic Survey steamship *Pathfinder.* Captain Engle extended me innumerable courtesies while I was on his ship and assisted me greatly in making collections on the Mindanao coast.

Genus **INSULASAURUS** novum

Type, *Insulasaurus wrighti* sp. nov.

Description of genus.—Legs well developed, pentadactyl; scales smooth; tympanum large, superficial; frontonasal divided; frontoparietals divided; interparietals divided; supranasals absent.

The genus belongs in the family Scincidæ in the "Lygosoma" group. It is related to *Sphenomorphus* but differs in the extraordinary character of the divided frontonasal, which likewise separates it from the other "Lygosoma" genera.

Insulasaurus wrighti sp. nov.

Type.—No. 1478, E. H. Taylor third collection; collected on Thumb Peak, near Iwahig, Palawan, October 26, 1923, elevation 1,000 meters, by Edward H. Taylor.

Description of type.—Rostral large, well visible from above, the suture formed with nasal larger than that formed with frontonasal; latter divided, the suture arising from left prefrontal; the combined area of the two scales about equal to that of one of the prefrontals; widely separated from frontal; prefrontals large, forming a long median suture, in contact laterally with upper postnasal, loreal, and first superciliary; frontal large, triangular, not equaling supraocular region in width, its widest part anterior to first supraocular; in contact laterally with first superciliary, separating prefrontal from supraoculars; frontoparietal divided, each part touching four supraoculars; interparietal moderate in size; parietals forming a broad suture behind interparietal, in contact with a single supraocular, separated from eye by three rows of small scales; no well-defined nuchals; nasal relatively large, placed diagonally, the large nostril pierced near center of scale; two postnasals superimposed, the upper narrow and curved; anterior frenal large, followed by two superimposed frenals; two or three small ill-defined preoculars; these frenals and preoculars separated from labials by a row of small scales which continue back to temporal region, the seventh small scale in this row wedged between fourth and fifth upper labials; lower eyelid scaled; twelve superciliaries; five supraoculars, first largest, second widest; temporals enlarged, the two bordering the parietals largest; eight upper labials, seven lower labials; mental with a larger anterior margin than rostral; postmental large, followed by three pairs of chin shields, only the first pair of which is in contact; tympanum very large, not deeply sunk; limbs well developed, pentadactyl, the posterior being brought forward the longest toe reaches axilla; fourteen scales under longest finger, twenty-five under longest toe; thirty-eight scale rows around body; preanal scales enlarged; tail (regenerated) with a row of broad scales both above and below (it is probable that this is not the normal condition).

Color in life.—General color above light brown with ill-defined lighter areas or lines; top of head dark chocolate brown; a median row of ill-defined dark spots on body, continuing on tail; side of head with light and dark areas; side of body with a few ill-defined dark spots on neck continued dorsolaterally as a very irregular line to some distance on tail; belly cream with dim darker markings on lower labials and neck; upper part of limbs reticulated with dark brown inclosing yellow cream spots; tail lighter brown than body; toes alternately barred with brown and cream.

Measurements of the type of Insulasaurus wrighti sp. nov.

	mm.
Total length, tail regenerated	146
Snout to vent	69
Length of head (snout to end of parietals)	13
Foreleg	23.5
Hind leg	34

Remarks.—The present species was taken at an elevation of approximately 1,000 meters on Thumb Peak (or Salacot), near Iwahig, Palawan. The specimen was collected during a rainstorm from under the loosened bark of a living tree. At first I suspected that it was a *Sphenomorphus,* a genus that had not been found in Palawan. The following day a new species, undoubtedly a *Sphenomorphus,* was taken in a neighboring locality.

The species is named for John Dutton Wright, of New York City and Santa Barbara, California, an educator and philanthropist, who partially financed my trip to Palawan and manifested great interest in the collections.

Brachymeles pathfinderi sp. nov.

Type.—No. 750, E. H. Taylor third collection; collected April, 1923, at Glan, Cotabato Province, Mindanao, by Edward H. Taylor.

Description of type.—Adult female. Rostral large, forming a considerable suture with frontonasal, separating the supranasals; frontonasal broader than long, in contact with frontal;

prefrontals small, widely separated; five supraoculars, two of which touch frontal; frontoparietals rather small, forming a distinct suture; parietals elongate, forming a suture behind interparietal; latter of the same shape, but smaller than frontal; no nuchals present; nasal extremely small, forming a mere ring about nostril; supranasal large, touching first labial behind nasal; two frenals, the anterior higher than the posterior; a minute preocular present; eye greatly reduced, lower lid covered with opaque scales; temporals enlarged, the largest bordering parietal; six upper labials, first largest, fourth entering orbit; seven lower labials, the two anterior touching postmental; three pairs of chin shields, second pair much broader than first pair, all three pairs separated, the first two pairs by a single scale, the third pair greatly reduced, separated by five scales; auricular opening very minute; twenty-four scale rows around anterior part of body, twenty-two around middle; limbs much reduced, foreleg with five clawed digits, hind leg with only four clawed digits.

Color in life.—Light gray-brown above, each scale with a dark brown spot, the spots forming six more or less continuous lines on back; dorsolaterally there is a broad light stripe covering two half rows of scales, below which is a dark stripe the width of two scale rows; belly and sides nearly flesh white with the darker spots on scales much dimmer than those on back.

Measurements of the type of Brachymeles pathfinderi sp. nov.

	mm.
Total length	119
Snout to vent	59
Tail	60
Width of head	6.5
Width of body	8.5
Axilla to groin	38
Foreleg	4
Hind leg	8

Remarks.—Several specimens of this species were taken on a headland near Glan, Cotabato Province. The species is obviously related to *Brachymeles gracilis* Fischer, but appears to replace that species in this part of Mindanao. Recent researches show that Mindanao has only recently been united into a single island. It is probable that this form was developed on an island which is now represented by the land between Sarangani Gulf and Davao Gulf. The distribution of Recent coral reefs on the present land body of Mindanao gives conclusive proof of the union of several islands to form Mindanao, as it exists to-day.

Other specimens of the new species agree with the type in all essential details. The chief differences between this species and *Brachymeles gracilis* are the loss of a digit on the hind leg, the reduced size, and the absence of a postnasal scale.

The species is named for the United States Coast and Geodetic Survey steamship *Pathfinder.* Through the courtesy of Mr. E. H. Pagenhart, director of the Coast and Geodetic Survey in the Philippines, and of the captain of the *Pathfinder,* I was enabled to visit and explore a considerable part of the coast of southern Mindanao.

Brachymeles wrighti sp. nov.

Type.—No. 1126, E. H. Taylor third collection; collected at Trinidad Farm School, Trinidad, Benguet Subprovince, northern Luzon, by students of the school, in 1923.

Description of type.—Rostral nearly triangular, bent back over snout, ending in a blunt point, making a short suture with frontonasal; nostril in a minute nasal, the scale merely forming a ring about nostril; supranasals very large, separated, touching one labial; frontonasal a little broader than long, rounded anteriorly and posteriorly, forming sharp angles on sides; prefrontals medium large, forming a short suture medially; frontal about as broad as long; five supraoculars, only two touching frontal; frontoparietals small, forming a median suture; interparietal large; two large frenals, anterior higher than posterior; one small preocular scale; six superciliaries; first labial greatly enlarged, followed by three of equal size, the third of which enters orbit, the following three labials small; seven lower labials, the first thickened and of lighter color than the others; the first two lower labials touch postmental; three pairs of chin shields follow postmental, none of which are in contact; third pair nearly as small as the other scales on chin; first pair widest (parietals and nuchals cannot be distinguished because of an injury to the specimen); scales in twenty-eight smooth rows; anterior and posterior limbs with four clawed digits; three lamellæ under longest finger, four or five under longest toe; preanals slightly enlarged. Owing to an injury to the specimen I am unable to determine absolutely whether the auricular opening is present or not; however, its appearance seems to point to the presence of an opening.

Color in alcohol.—Dark shiny brown above, each scale with a darker central area; below tan, each scale with a dark blackish brown spot; darker under tail; a pair of distinct dark spots on the slightly enlarged preanals; tail above darker than body.

Measurements of Brachymeles wrighti sp. nov.

	mm.
Total length (tail broken and part missing)	225
Snout to vent	130
Axilla to groin	94
Snout to foreleg	27.5
Foreleg	4.5
Hind leg	9.7

Remarks.—I have seen but not studied a second specimen of this remarkable species which is in the possession of the parish priest of Baguio. This specimen was taken when excavations were being made in 1923 for the new Catholic church building in Baguio.

This species, in general size and appearance as well as in relative proportions and color, resembles *Brachymeles bicolor* (Gray). However, a number of essential characters, such as the absence of a postnasal, the enlargement of the first upper labial, the shape and position of the rostral, the separation of the internasals, and the loss of a digit on both anterior and posterior limbs, easily separate the forms. The closest relationship is with another, much smaller species, *Brachymeles eleræ* Taylor. In the arrangement of the head scales and characters and numbers of the digits there is marked similarity.

Brachymeles eleræ is known from four specimens, which have the following snout-to-vent measurements: Type, 68 millimeters; cotype, 63; Kalinga specimens, 69 and 71.5. The type locality is unknown. The last-listed specimen is an adult female containing embryos. All are adult. The present species is nearly double the size of any of the known specimens of *Brachymeles eleræ.* Moreover, the type specimen does not appear to be old, since the second specimen examined appeared to be larger. Aside from the difference in size, there are from four to six more scale rows around the body, better-developed digits, and a different arrangement of the chin shields.

The type was collected by Igorot schoolboys who plowed up the specimen on the school farm. It was mutilated by a blow from a bolo, thus destroying certain characters of the parietal and temporal regions. The species is named for my friend

John Suarez Wright, a young naturalist of Santa Barbara, California, who accompanied me on many collecting trips about Baguio, and assisted me in many ways.

SNAKES

Holarchus perkinsi sp. nov.

Type.—No. 1164, E. H. Taylor third collection; collected at Culion, Culion Island, September, 1923, by Granville A. Perkins.

Description of type.—Adult female. Rostral very prominent, thickened, standing out from the surrounding scales, the portion visible above equal to distance from rostral to frontal; internasals much broader than long, triangular, their mutual suture less than half that between the prefrontals; prefrontals irregularly hexagonal, separated from labials by a small loreal, broadly in contact with supraocular; frontal very slightly longer than broad, slightly longer than parietals, twice as broad but nearly same length as supraoculars; parietals rather irregular in shape, about as broad as long; nasal large, partially divided by a suture which enters nostril; eye small, its diameter less than its distance from mouth or nostril; loreal small, nearly square, equal in size to one-third the area of the single large preocular; a single curved elongate postocular; temporal formula 1 + 2 + 2; seven upper labials, the sutures between the scales directed up and backward; second labial touches preocular, third and fourth labials enter eye; mental small, triangular; first pair of lower labials rather broad; eight lower labials, four in contact with first pair of chin shields, which are more than two and one-half times the size of second pair; scales in seventeen rows, all smooth, without apical pits; ventrals, 188; anal, single; ventrals, 45.

Color, freshly preserved in alcohol.—Ground color grayish lavender; a median broken line of very dull brick red extends from parietals to tip of tail; the reddish line bordered on either side by an irregular line of blackish, which incorporates a large number of darker spots that tend to form bars across back; these are more noticeable toward the posterior half of body; a fairly distinct line of elongate, lighter-edged, dark spots on third row of scales, becoming indefinite on posterior part of body; many small irregular spots scattered on the intervening scale rows; outer edge of each ventral with a dark spot, each alternate spot more pronounced; on each side of ventrals, a short distance from edge, is a row of quadrangular spots on each alternate scale, each ventral having only a single spot, either on the left or on the right side; head uniform slate, the usual characteristic head markings of the genus apparently wanting in the species; belly flesh to dull pink.

Measurements of the type of Holarchus perkinsi sp. nov.

	mm.
Total length	672
Tail	90
Width of head	17
Length of head	19
Vertical diameter of eye	2.5
Eye to mouth	3.1

Remarks.—The species was discovered on Culion Island by Dr. Granville A. Perkins, who presented the specimen to me. I have named it in honor of its discoverer.

This is the first record of the genus *Holarchus* in the Palawan group of islands, to which Culion and the other Calamianes belong. There are notable differences between the Calamianes and Palawan as regards faunas, and the presence of a species in the Calamianes does not warrant the statement that it will be found in Palawan. Nevertheless, it is probable that this or a related species will be taken there.

The species seems to be related to *Holarchus signatus* in the general arrangement of the head scales, but the very large ventral count of this species and the totally different color markings make this supposed association of little value. From other Philippine species the species is well differentiated by scale arrangement, color markings, and the ventral and subcaudal counts.

Holarchus maculatus Taylor.

Holarchus maculatus TAYLOR, Philip. Journ. Sci. § D 13 (1918) 364.

A third specimen of this rare species of *Holarchus,* taken in northern Surigao, Mindanao, was recently presented to me by Prof. C. F. Baker, dean of the College of Agriculture, Los Baños, Laguna Province, Luzon.

The specimen shows the following characters, differing from the type: There is a small loreal present (absent in the type but present in the cotype), separated from preocular by prefrontal; prefrontal, as in the type, touches two labials. The sixth labial is crowded back from mouth, leaving fifth and seventh labials in contact, a condition which does not obtain in either of the two known specimens.

The scale counts are as follows: Ventrals, 164; subcaudals, 52. There are twenty-four spots on the body and tail. In other characters the specimen agrees with the type. It would appear that the loreal is a normal element.

Dryophiops rubescens (Gray).

Dipsas rubescens GRAY, Ill. Ind. Zool. 2 (1834) pl. 84, fig. 2.
Leptophis rubescens BLYTH, Journ. As. Soc. Bengal 23 (1855) 293.
Crysopelea rubescens (part) GÜNTHER, Cat. Snakes Brit. Mus. (1858) 145 and Rept. Brit. India (1864) 299; STOLICZKA, Journ. As. Soc. Bengal **39** (1870) 195.
Dryophis rubescens JAN, Elenco (1863) 88 and Icon. Gén. **32** (1869) pl. 6, fig. 1.
Dryophiops rubescens BOULENGER, Cat. Snakes Brit. Mus. **3** (1896) 194; Fauna Malay Pen. Rept. and Batr. (1912) 176.

This is the first authentic[2] record of *Dryophiops rubescens* (Gray) for the Philippines.

A single specimen, now in the collection of the Bureau of Science, was captured on Peñon de Coron Island in September, 1922. This island is one of the Calamianes group lying north of Palawan.

The specimen agrees well with the published descriptions of the species, save that the loreal is broken into two parts, leaving what appears to be a small postnasal. I suspect that it is an individual variation.

The following are the scale counts and measurements of the specimen: Ventrals, 193; anal, divided; subcaudals, 124; ventral preceding the anal, divided; nine upper labials, third and fourth entering eye; ten to eleven lower labials, first five (six on left side) touching anterior chin shields; one preocular, broadly touching frontal; two postoculars; temporals 2 + 2; scales in fifteen rows. Total length, 840 millimeters; tail, 255.

The color of the freshly preserved specimen is brownish above with more or less distinct small dark spots on back. The skin between scales blackish or bluish white, forming more or less regular patterns. The anterior part of belly yellowish white, posterior part and the subcaudal regions dull reddish brown. The outer edge of the ventrals keeled and notched, and covered with a few small yellow flecks. A few small black spots on ventrals and subcaudals. Chin and lower labials white, upper labials dull yellow, edged above with darker. Both upper and lower labials have small black dots. Head with numerous broken lines on the top and a distinct line on the side.

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[2] Günther, Cat. Col. Snakes (1858) 145; Stoliczka, Steindachner, Reise d. Novara, Rept. Wien (1869) 71; and Boettger, Ber. Senck. Nat. Ges. (1886) 112, have reported this species from the Philippines. However, the specimens so reported were actually *Dryophiops philippina* Boulenger, a species confined to the eastern Philippines.

The presence of the small "postnasal" scale does not warrant giving this form a specific designation unless it should prove a constant character in subsequent material. It is very probable that the species will eventually be discovered on the other Calamianes and in Palawan, since it is known in Borneo.

The specimen on which this record is founded was collected by Gregorio Lopez, a collector of the Bureau of Science, who has made many excellent collections in various parts of the Philippines.

NOTES ON PHILIPPINE SHARKS, II

THE GREAT WHITE SHARK, THE WHALE SHARK, AND THE CAT SHARKS AND THEIR ALLIES IN THE PHILIPPINES

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ONE PLATE

In these notes are described the largest of the man-eating sharks, the still more enormous but harmless whale shark, and the cat sharks, the latter a group of harmless bottom-feeding sharks mostly of small size and feeding principally upon mollusks and crustaceans. The family boundaries of the cat sharks are ill defined and in at least one case an erroneous grouping has been made. These facts show that our knowledge of many tropical fishes must remain defective until such time as living examples shall have been studied in their native habitat during all their growth stages and over considerable intervals of time. Some of the sharks treated in this paper undergo very great changes in color, and the specific boundaries are often indistinct. None of those considered here is of any direct economic importance.

Key to Philippine shark families here described.

a^1. Two dorsals, without spines.
  b^1. Sides of tail keeled; caudal axis elevated.
    c^1. Teeth very large, erect, triangular, serrated, without denticles at base; snout produced; caudal pits present; last gill opening entirely in front of pectorals.. **Lamnidæ.**
    c^2. Teeth minute, very numerous; a pit at base of supracaudal; last gill opening above base of pectorals........................ **Rhineodontidæ.**
  b^2. Sides of tail not keeled; caudal axis not elevated.
    d^1. Caudal fin lobed; anal usually before second dorsal. **Scylliorhinidæ.**
    d^2. Caudal fin not lobed; anal behind second dorsal........ **Orectolobidæ.**
a^2. One dorsal present, without spines.. **Pentanchidæ.**

LAMNIDÆ

THE MACKEREL SHARKS

This family comprises large, swift, voracious stout-bodied sharks, with wide mouth and large teeth; the tail is slender, with lunate caudal fin, upper lobe strongly bent upward; caudal peduncle with a strong keel on each side; gill openings wide, all before the pectorals, entirely lateral, not extending upon throat; first dorsal and pectorals large, ventrals moderate, second dorsal and anal very small; there is a pit at root of caudal both above and below; the minute spiracles are behind eyes, or sometimes absent.

In this family are found the swiftest, strongest, and most savage sharks, with the most-specialized teeth and muscular system of all the elasmobranchiates, a group containing few genera, only one of which is known from the Philippines.

Genus **CARCHARODON** Smith

Carcharodon ANDREW SMITH, Proc. Zool. Soc. London 5 (1837) 86.

The fusiform trunk is massive anteriorly, with large conical head, and produced snout; mouth large and crescent-shaped, with large, flat, erect, triangular, serrate teeth, broader in upper jaw, and with the third tooth on each side of upper symphysis noticeably smaller than the ones beside it; first dorsal large, nearly midway between pectorals and ventrals; caudal peduncle stout, depressed, with lateral keels and caudal pits; caudal with vertebral axis strongly elevated posteriorly and with a much-produced subcaudal lobe.

Numerous fossil and one living species, the latter the fiercest of all fishes.

Carcharodon carcharias (Linnæus).

Squalus carcharias LINNÆUS, Syst. Nat., ed. 10 1 (1758) 235.

Carcharodon carcharias JORDAN and GILBERT, Synopsis, U. S. Nat. Mus. Bull. 16 (1883) 875; GARMAN, Mem. Mus. Comp. Zool. Harv. Coll. 36 (1913) 32, pl. 5, figs. 5 to 9; COLES, Copeia, No. 69 (May 7, 1919) 35, pl. 3, fig. 1.

Carcharodon rondeletii GÜNTHER, Cat. Fishes 8 (1870) 392.

Man-eater shark; great white shark.

Body stout, depth about 5.5 in total length; head a little more than 0.25, body cavity more than 0.5, and caudal less than 0.2 of total length; snout very characteristic in shape, subconical, somewhat blunt, projecting well beyond the inferior, very large mouth; labial folds present; both jaws with five rows of large, triangular, serrated teeth, those in lower jaw narrower, about $\frac{24}{22}$ or $\frac{26}{24}$ in each row; a minute spiracle behind eye or sometimes lacking; first dorsal somewhat behind the large falciform pectorals but in front of middle of total length; second dorsal very small, its base entirely forward of that of the similar anal; ventrals rather small, midway of interdorsal space; the broad peduncle has a pit above and a less-developed one below; caudal large, strong, lunate, the upper lobe elevated and longer than the lower which is much produced, so that caudal is deeper than long; scales small, three-keeled.

Color leaden gray or slaty brown above, shading to white on sides and underparts; tips and edges of pectorals black, or with a black spot in axil; other fins darkening backward, except ventrals.

This shark, the most dangerous of all selachians, is said to reach a length of about 13 meters and it roams the open seas throughout tropical and temperate waters. Though apparently nowhere numerous, it is taken from time to time in nearly all parts of the Atlantic and Pacific Oceans. In November, 1920, while passing through Camiguin Strait, I saw a specimen approximately 7 meters in length off the northern coast of Mindanao. In February, 1923, Major George R. Callender, United States Army Medical Corps, caught one approximately 3 meters in length, in Malampaya Sound, Palawan, and took a photograph of it showing the characteristic features of the head and snout, almost a duplicate of Coles's plate cited above. So far as known, these are the only Philippine records.

RHINEODONTIDÆ

WHALE SHARKS

Sharks of enormous size with five exceedingly wide gill openings extending from the back almost to the median line of the throat, the last two above the base of the large falciform pectorals; caudal lunate, the upper lobe strongly elevated; the enormous mouth terminal, with minute, very numerous conical teeth; the eyes very small, the spiracles almost the same size, behind eyes and on the same level; two dorsals, without spines, the first much the larger, its origin in advance of ventrals; anal very small; the tail has a pit at root of supracaudal and a keel on each side of caudal peduncle.

Genus **RHINCODON** Smith

Rhincodon SMITH, Ill. Zool. South Africa 4 (1849) pl. 26.

Characters included in family diagnosis. Probably but a single species, in the Indian and Pacific Oceans and the Gulf of Mexico.

Rhincodon is supposed to be a misprint for *Rhineodon* or *Rhinodon.*

Rhincodon typus Smith. Plate 1.

Rhincodon typus SMITH, Zool. Journ. 4 (1829) 443; GARMAN, Mem. Mus. Comp. Zool. Harv. Coll. 36 (1913) 42.

Rhinodon typicus MÜLLER and HENLE, Plagiostomen (1841) 71, pl. 35, fig. 2; GÜNTHER, Cat. Fishes 8 (1870) 396; Fische der Südsee 3 (1910) 486.

Rhinodon pentalineatus KISHINOUYE, Zool. Anz. (1901) 694.

Rhineodon typicus JORDAN and FOWLER, Proc. U. S. Nat. Mus. 26 (1903) 626.

Head very broad, flat, and blunt, with a very short, broad, almost truncate snout; body very bulky, abdominal cavity more than half the length; eye very small, lateral, near angle of mouth; nostrils at end of snout, near lip, the anterior valves widely separated, without cirri, nasoral grooves extending to mouth; labial folds on both jaws; the minute teeth exceedingly numerous, twelve to fifteen or sixteen to thirty in a longitudinal row, and two hundred fifty to three hundred or more in a transverse series; a pair of ridges or keels on each side beginning above gill openings, the upper extending back to the interdorsal space, the lower meeting keel at side of tail; pectorals large, broad, falciform, with sharp angles and concave inner margin; first dorsal large, nearly at middle of total length, second dorsal small, anal still smaller, its origin below posterior portion of second dorsal.

Color blackish to reddish or grayish brown, with circular or oval spots or streaks of white or yellowish, some of them arranged in small crossbands; on head the spots are smaller and crowded, becoming larger and more scattered posteriorly.

This enormous animal, whalelike in its size, certainly attains a length of more than 16 meters, and is the largest of all sharks. It is easily recognized by its size, the shape of its head and mouth, and its white-spotted skin. Though so gigantic, it is harmless to man except in self-defense and feeds mainly upon crustaceans, which it finds in uncountable swarms upon the surface of the open sea.

A specimen taken in a fish trap at Argao, Cebu, on September 14, 1914, measured 5.49 meters in length. An excellent photograph of it is in my possession and shows all the characteristic features. Another specimen was taken at Bacolod, Occidental Negros. There is a stuffed specimen, about 4.2 meters long, in the museum of Santo Tomas University. According to the

Filipino curator, it was taken in Manila Bay, about 1840, by fishermen from Navotas. It has evidently suffered hard usage, and in places painted canvas has been used to repair injured portions, but it has all the typical characters except the white spots.

There seem to be two centers of distribution for this shark, one about the Seychelles in the Indian Ocean, where it is most abundant, the other in the Gulf of Mexico. Originally described from the Cape of Good Hope, it has been recorded in many localities from South Africa to Japan, and also from California, Panama, Peru, Chile, and the coast of Florida.

SCYLLIORHINIDÆ

A family of small sharks found in warm seas, comprising several genera and a number of species. There are two rather small, spineless dorsal fins, the first more or less behind the ventrals and always behind the body cavity; an anal fin is present, usually before second dorsal; caudal fin rather long, usually with a basal lobe; tail not keeled and not bent upward; spiracles close behind eyes; there is no nictitating membrane; gill openings small, the last one above pectoral; mouth large, with small sharp teeth, each with a median cusp and one to four lateral cusps on each side; several series of teeth are in function; nostrils near mouth, more or less confluent with it, and sometimes they have cirri; mucous pores numerous on head, especially on lower side of snout; scales small, with one to several cusps, the median one and its keel usually being sharper than the others; the eggs are inclosed in large four-sided horny cases, with long filaments or tendrils at the corners.

The genus *Chiloscyllium* is incorrectly placed under the Hemiscylliidæ by various authors, this family being separated because its members are ovoviviparous. This distinction cannot hold for *Chiloscyllium,* as the females of that genus kept in the Bureau of Science Aquarium lay eggs freely every year and are far from being ovoviviparous.

Key to the Philippine genera of Scylliorhinidæ.

*a*¹. Nasal and mouth cavities confluent; spiracles very distinct, below eyes. **Chiloscyllium.**

*a*². Nasal and mouth cavities with a rudimentary connecting groove; spiracles minute, directly behind eyes.............................. **Atelomycterus.**

Genus **CHILOSCYLLIUM** Müller and Henle

Chiloscyllium Müller and Henle, Sitzb. Akad. Wiss. Berlin (1837) 112.

The long, slender tail is more than half the total length; the short, depressed head narrowed above and forward; the small eyes have no fold on lower lid; the small, very distinct spiracle is below posterior part of eye, and may or may not have a process on its hind margin; the inferior nostrils are near end of snout, confluent with mouth by a nasoral groove; the anterior nasal valves reach mouth, are widely separated by the median preoral attachment, and each has a long, pointed cirrus; the posterior valves form a fold at outer side of nostril, which is continued in a fold on outer edge of nasoral groove, with a short free extremity; the transverse mouth has labial folds around the angles; lower lip is well developed and has a fold across chin below symphysis; teeth small, triangular, with or without lateral cusps, three or more series functioning; the last two gill openings are close together, the last three above pectoral; fins medium to small, the two dorsals above the space between ventrals and anal; the last named is far back, narrow, and close to the narrow subcaudal.

Garman recognizes four species, ranging from South Africa to Japan and Australia.

Key to the Philippine species of Chiloscyllium.

a^1. Origin of first dorsal above anterior half of ventral bases; dorsals larger than ventrals, their posterior angles produced.... C. punctatum.

a^2. Origin of first dorsal above middle of ventral bases; dorsals smaller than ventrals, their posterior angles not produced.......... C. plagiosum.

Chiloscyllium punctatum Müller and Henle.

Chiloscyllium punctatum MÜLLER and HENLE, Plagiostomen (1841) 18, pl. 3; GÜNTHER, Cat. Fishes **8** (1870) 413; GARMAN, The Plagiostomia, Mem. Mus. Comp. Zool. Harv. Coll. **36** (1913) 61; SMITH, Proc. U. S. Nat. Mus. **45** (1913) 567.

Head contained a little more or less than 6.5 times in total length, depth from 8 to 10 times; snout from 1.9 times to twice in head; width of head nearly equal to its length, being contained 1.2 times in the latter; eyes small, 7 to 8.5 times in head and 2.5 to 3 times in interorbital space which goes from 2.77 to 2.83 times in head; base of pectorals about $\frac{5}{8}$ that of anal; tail from 64 to 65 per cent of total length.

This is a small, slender, subcylindrical animal, the median dorsal ridge only evident between the dorsal fins; the head is large with broad, bluntly rounded snout and convex profile, the interorbital space becoming flattened or slightly concave with age; the small elongate eyes are very high up, their forward margin about midway from tip of snout to first gill slit; the spiracles are a little more than half as large as eyes and lie below posterior margin of latter; the large nostrils lie very close to margin of snout and are confluent with mouth by a wide deep passage covered by large flaps; the broad inner nasal valve is free posteriorly, and anteriorly has a long slender cylindrical barbel which extends backward across mouth to posterior lip; the outer flaps are somewhat earlike, their free posterior lobe extending to upper corner of mouth, which is a straight transverse opening $\frac{4}{7}$ of length of head behind tip of snout; a short broad fold around angles on each side of mouth and a broad transgenial fold across the lower lip, its posterior margin more or less notched; gill openings of moderate size, the second and third largest, not the hindmost as stated by Garman; fourth and fifth very close together; third to fifth over pectoral.

The small scales are sharp pointed with a median keel, those on dorsal surface coarser and sharper; those on undersurface of snout and trunk tend to be smaller, smoother, and blunter.

Dorsal fins larger than ventrals, the first one larger than the second, their posterior margins concave and posterior angle extended backward in a point; origin of first dorsal above that of ventrals; posterior extremity of second dorsal does not quite extend to a vertical from origin of anal; pectorals rather narrow, with rounded angles and oblique posterior margins; anal fin short, its free portion about half as wide as its base; upper lobe of caudal low and very slightly elevated; lower lobe much wider and divided near tip by a conspicuous notch.

Color whitish to brownish white, with about ten broad bands of gray-brown or brown and a large spot of the same color on extremity of snout. The first crossbar is across the nape with an irregular anterior margin extending forward from eyes in a semicircle and laterally curving forward as far as mouth; the second bar is between the pectorals, dividing laterally, the anterior portion descending upon gill slits, the posterior part curving back almost as far as posterior part of pectoral fin; the third bar is in front of first dorsal, the fourth over first dorsal, the fifth between the two dorsals, the sixth on second dorsal, the seventh reaching to forward portion of anal, and the others on caudal fin. In young specimens the bands, beginning with third, completely encircle body; in older specimens only those posterior to first dorsal form complete rings. Anterior margins of gill openings more or less whitish.

Here described from three females, respectively, 435, 360, and 200 millimeters long, and two males, 260 and 232 millimeters in length. The males are very immature and the females are likewise not mature. The largest two females were obtained by Mr. Alejo Arce in San Miguel Bay, Camarines Sur Province; the others are from Calapan, Mindoro. I have also recently examined a fine young male, 270 millimeters long, from Calapan, Mindoro.

I also place here tentatively two large females, one 770 millimeters, the other 895 millimeters in length. These agree in the main with those already described but differ in having supraorbital ridges, a well-defined depression anterior to each eye, and in being markedly different in color. The upper half of the body is nearly uniform dark brown without bands or spots, while the lower and underparts are very pale brown or gray-brown; the upper side of the pectorals and ventrals is concolorous with the back; the anterior margins of the gills are very pale.

These specimens are the variety *obscura* ζ of Günther and are intermediate between *Chiloscyllium punctatum* and *Chiloscyllium griseum* of Garman. They are without locality but are presumably from Manila Bay. Garman recorded this species from "the Philippines." The Albatross Expedition obtained a specimen at Siasi, one at Zamboanga, and one at Cebu. It is apparently confined to the East Indies.

Chiloscyllium plagiosum (Bennett).

Scyllium plagiosum BENNETT, Memoir Raffles (1830) 694.

Chiloscyllium plagiosum MÜLLER and HENLE, Plagiostomen (1841) 17, in part; REGAN, Proc. Zool. Soc. London (1908) 362, pl. 12, fig. 2; GARMAN, The Plagiostomia, Mem. Mus. Comp. Zool. Harv. Coll. **36** (1913) 62.

Chiloscyllium indicum JORDAN and FOWLER, Proc. U. S. Nat. Mus. **26** (1903) 605, fig. 2, excluding synonymy.

Head contained about 6.5 to 6.75 times in total length, depth a little more than 10 times; snout a little more than twice in head; interorbital space contained 2.6 times in head and is 3⅓ times the long diameter of eyes; width of head 1.28 times in its length; base of pectoral contained about 2.5 times, base of anal about 1.5 times in head; tail more than 64 per cent of total length.

This slender, elongate shark has a low median dermal keel on the trunk and a tapering tail much exceeding the body; the head is long with a short, broadly rounded snout and convex profile, the interorbital space flattened or slightly concave. The eyes are small, high up, rather widely spaced, in forward half of head; just below and behind posterior extremity of eyes lie the smaller spiracles, their margins more or less crenate lobulate; nostrils large, each confluent with mouth by a wide, deep passage which is so covered by fleshy flaps as to appear as a narrow groove; the inner flaps each with a pointed barbel extending back to mouth and with broad posterior denticulate margins; the outer nasal flaps with a conspicuous earlike fold extending posteriorly almost to the angle of the wide, transverse, straight mouth, which is nearer eyes than tip of snout. Mouth has a short, broad, thick fold around angles on both jaws; those on lower lip covered with a very wide transgenial fold which is more or less scalloped posteriorly. Gill openings narrow, the posterior one widest, fourth and fifth very close together, and the last three above pectorals. Scales rather large and coarse, irregular, keeled, and more or less pointed, but becoming smooth eventually.

Both dorsals smaller than the ventrals; first dorsal slightly larger than second, its origin a little nearer tip of snout than to origin of first caudal lobe, and above the middle of the ventral bases; posterior margin of both dorsal fins almost vertically straight, the angles not produced; the space between the two dorsals contained about 1.5 times in head; anal very far back and separated from caudal only by a deep notch, its base much longer than that of second dorsal; caudal narrow, upper lobe low and not bent up but continuous in a straight line with upper profile of body; lower lobe wider than upper lobe and divided by a notch near tip.

The head has a number of large, scattered, and rather noticeable mucous pores along top and sides, extending back as far as above the last gill slit.

The color in life varies from gray with a slight brownish cast to a grayish brown, whitish or paler beneath, with about twelve or thirteen irregular, dark brown crossbands above, the first on the crown, the second between the pectorals, the third at the tips of the pectorals, the fourth at the origin and the fifth at the posterior portion of the first dorsal, the sixth just before and the seventh from the middle to behind the second dorsal, the eighth just before the caudal origin, and the others upon the caudal fin; these dark crossbands extend upon the fins; a large deep brown spot usually present between each pair of bars on middle line of back; three large conspicuous white spots on each side between pectorals and ventrals and many small white spots more or less irregular in size scattered over entire body; the spots are most conspicuous within the crossbars and soon disappear from underside.

This species is common in Manila Bay and is here described from some female specimens kept alive for several years in the Bureau of Science Aquarium. They vary in length from 620 to 710 millimeters. These specimens laid many eggs which resemble those of rays more than those of most sharks. The blackish shells are very firm and strong and are provided with long filaments along one edge. Females are evidently mature by the time they reach a length of 600 millimeters.

I have also examined three males, one a fine mature specimen 730 millimeters long with large and well-developed claspers. The dark bands are rather pale, and the rest of the fish is nearly uniform brown-gray. The others are 375 and 160 millimeters long, respectively. Both are much darker than the females, especially the smaller one, in which the crossbands on the head and trunk are confluent on the sides. The underparts are uniform brown on the smallest one, but are white spotted on the next larger one. In both the claspers are quite undeveloped, being but 6 millimeters long in the fish that is 375 millimeters long. Two males, 155 and 190 millimeters long, were recently obtained at Calapan, Mindoro.

This species occurs in shallow sandy bays on the coasts of the Malay Peninsula and adjacent islands, China, Formosa, and southern Japan.

Genus **ATELOMYCTERUS** Garman

Atelomycterus GARMAN, The Plagiostomia, Mem. Mus. Comp. Zool. Harv. Coll. **36** (1913) 61.

Body elongate, slender, tail longer than abdominal cavity; eye large, with an apparently translucent or semitransparent and well-differentiated lower lid, the upper edge of which closes inside the upper lid; spiracles small, close to eyes; nostrils nearly midway from mouth to end of snout, with a rudimentary nasoral groove, without cirri and without posterior nasal valves; the anterior valves reach mouth in rounded lobes, and are separated by a median attachment in front of symphysis of jaws; mouth with long labial folds and strong jaws; teeth small, tricuspid, the median cusp longest; dorsals larger than anal, origin of first dorsal above ventrals; hind angles of dorsals and anal produced; subcaudal narrow, without a prominent lobe.

Only one species is known.

Atelomycterus marmoratus Garman.

Scyllium marmoratum BENNETT, Memoir Raffles (1830) 693; GÜNTHER, Cat. Fishes **8** (1870) 400; DAY, Fishes of India (1878) 724, pl. 190, fig. 2.

Atelomycterus marmoratus GARMAN, The Plagiostomia, Mem. Mus. Comp. Zool. Harv. Coll. **36** (1913) 100.

Scyliorhinus marmoratus MAX WEBER, Fische der Siboga Exp. (1913) 595.

The large head contained 5.67 times in total length, and rather low and narrow, its anterior half much depressed; the broadly rounded snout short, its length equal to distance between nostrils, 3.25 times in head; eyes large, their longitudinal diameter 4.33 times in head and about 4 times as great as transverse diameter; lower lid wide, concealing much of eye, making it rather slitlike; directly behind eyes are the very small and nearly circular spiracles; the visible opening of nostrils is small and midway between tip of snout and mouth; the anterior valves are large, somewhat pointed flaps covering nearly the whole nostril openings and extending to mouth; they are separated by a rather broad attachment in front of symphysis; the large, broadly angled mouth has long thin labial folds around angles; first four gill openings all approximately half as wide as length of eye; fourth gill opening over origin of pectoral fin, fifth noticeably narrower and above pectoral; fins all small; inner angle of pectorals broadly rounded, angle of dorsal and anal moderately produced; origin of first dorsal above middle of ventrals; that of second dorsal approximately above middle of anal; interdorsal space about twice the length of base of either first or second dorsal, the basal lengths of which are approximately equal; anal little more than half the size of second dorsal, which is noticeably smaller than first dorsal, though its base is fully as long; supracaudal very low, small, continuous with upper line of body; subcaudal rather short, narrow, with a notch very near posterior extremity.

Posterior half of trunk compressed, the elongate tail strongly so; tail longer than head and trunk together, being approximately 0.6 of total length; male claspers narrow, slender, and rodlike; scales very small with a long, sharp central cusp and with rather rudimentary lateral cusps, or these altogether absent.

Color whitish to brownish gray, unspotted beneath head and trunk; upper parts covered with irregular dark brown spots and blotches which may be arranged in lines along body or be more or less confluent or form transverse bands over back; those on snout small and obscure; dorsal surface in my specimens with two to four rows of prominent white spots or ocelli; pectorals and ventrals with broad posterior white margins and the other fins more or less completely margined by white.

Here described, except for color, from a young male, 295 millimeters long, from Sitanki. I have also examined two mutilated female specimens from the same locality, which had been eviscerated, split, and the tail removed ready to be dried for food. The larger of these was over 500 millimeters long in life.

Since the above was written my collector, Mr. G. A. Lopez, caught four fine specimens at Dicuayan, a small island on the coast of Busuanga, one of the Calamianes group. One is a female 560 millimeters long, the others are males from 555 to 570 millimeters in length. The claspers of the males are styliform, and from 75 to 78 millimeters in length.

This small, harmless shark is found throughout the East Indies to the coast of India. It is used as a food fish by the Badjaus of the Sulu Archipelago.

Hitherto not known from the Philippines except from a specimen purchased by Max Weber from fishermen in the Sulu Sea.

ORECTOLOBIDÆ

The sharks of this family have broad, thickset head and trunk; the tail is long and slender, with short or long caudals; the nostrils are connected with the mouth by a groove and have a cirrus on anterior nasal valve; mouth transverse, with labial folds around angle on both jaws; teeth compressed, with or without lateral cusps at each side of the central one; eyes small, without a nictitating membrane; spiracles small, behind or behind and below posterior portion of eyes; gill openings small or of medium size, the last two or three above pectorals; fins short and broad except the caudal, which is narrow, not lobed and not elevated; anal small, close to caudal, behind second dorsal; the fins have no spines and there are no pits at root of caudal. Some of the genera are marked by skinny flaps and lobes upon the head.

One genus of the family is recorded from the Philippines.

Genus **STEGOSTOMA** Müller and Henle

Stegostoma MÜLLER and HENLE, Sitzb. Akad. Wiss. Berlin (1837) 112.

Body slender with a prominent median dorsal ridge; head short and broad with short, thick, blunt snout and with a long, slender, laterally compressed tail which is much more than half the total length; the nostrils have a nasoral groove; anterior valves united in a broad thick pad in front of the preoral fold, each with a cylindrical cirrus; posterior valves reduced to a narrow fold on outer side of groove, terminating in a short flap at angle of the transverse mouth; labial folds around angles of mouth short; modified scales are present on nasal valves, the fold before mouth, and chin; teeth small, tricuspid, in about twenty-eight rows in each jaw; the small eyes have no folds on lids; the small spiracles are behind eyes; gill openings small, the fourth and fifth close together, the last three above pectoral; dorsals small, the first above ventrals, the second anterior to and smaller than anal, which is near the long horizontal caudal; the narrow subcaudal not lobed.

Only one species is known.

Stegostoma varium (Seba).

Squalis varius SEBA, Thesaur. 3 (1761) 105, pl. 34, fig. 1.

Squalis tigrinus FORSTER, Zool. Ind. (1781) 24, pl. 13, fig. 2.

Stegostoma fasciatum MÜLLER and HENLE, Sitzb. Akad. Wiss. Berlin (1837) 113.

Stegostoma tigrinum GÜNTHER, Cat. Fishes 8 (1870) 409; DAY, Fishes of India (1878) 725, pl. 187, fig. 4; TANAKA, Fishes of Japan 4 (1911) 65, pl. 16.

Stegostoma varium GARMAN, The Plagiostomia, Mem. Mus. Comp. Zool. Harv. Coll. **36** (1913) 59.

Head large, broad, and thick with a convex crown and short, wide, broadly rounded snout, and contained from 6.35 to 8.33 times in total length; tail very long and greatly compressed, ranging from 68.85 to 71.87 per cent of total length, while head and trunk together are contained from 2.21 to 2.55 times in tail; breadth of head a little more or less than its length; eyes small, high up on head, their longitudinal diameter from 10.25 to 10.8 times in head; the large, wide open spiracles lie immediately behind eyes, their vertical diameter longest and greater than length of eyes; the nearly circular nostrils very close to margin of snout and connected with mouth by a deep groove; the inner valves fused into a broad pad which is free at corner of mouth, each with a slender cylindrical barbel which extends posteriorly as far as edge of lip; the outer valves reduced to narrow folds and each terminates in a short flap at angle of mouth; mouth transverse, with short, thick labial folds around angles and with a thin, narrow fold in front of upper teeth and behind nasal flap; the third or the second and third gill openings largest, the fifth smallest, the fourth and fifth overlapping, the second above origin of pectoral, the last three above pectoral.

Dorsal, anal, and ventral fins all rather small, second dorsal very small; pectorals well developed, broad, extending posteriorly as far as ventrals; supracaudal very low; subcaudal rather broad, notched near posterior end but not completely divided; supra- and subcaudals not united but the vertebral column projects in a point between them.

Color and general appearance vary with age. The young have a white or slightly yellowish ground color, with black or dark brown crossbands or stripes so that the ground color shows as narrow white or yellowish bands across back, between which may be white spots; underside of head and trunk white or buff, while the dark stripes break up into spots and short bands on sides and on pectoral, ventral, anal, and subcaudal fins; as they grow larger the broad dark bands on head and trunk become paler, with many round spots of their original dark color. The ground color becomes brown or brownish yellow while the dark transverse bands are reduced to a more or less irregular arrangement of circular dark spots; in very large specimens the spots are said to disappear almost entirely.

This odd-looking fish is very striking in appearance when young and in shape is very like a tadpole. I have had living specimens in the aquarium and have examined eight preserved specimens ranging in length from 305 to 1,195 millimeters. All the specimens I have seen came from Manila Bay or the coast of central Luzon except the largest one, which came from a river at San Jose del Monte, Bulacan Province, a distance of more than 35 kilometers by water from Manila Bay. This species is found in bays and shallow seas and around the mouths of rivers from Japan to Zanzibar. It is said to reach a length of 4 or 5 meters. Ordinarily this is not a dangerous species, as it is sluggish and a bottom dweller. According to Day it feeds by preference upon mollusks and crustaceans.

PENTANCHIDÆ

This family is distinguished at once from its allies by the presence of but one dorsal fin and a long, flat, pointed snout; the body is elongate with short body cavity and long, depressed head, the tail nearly straight; the mouth is inferior; the teeth are erect, in several rows, with three to five cusps, and alike in both jaws; the spiracles are minute, immediately behind the eyes; gill openings five, the last three over the base of the large, broad pectorals; the ventrals are inserted before the center of the body; the anal and caudal fins are both long, the latter with a large subcaudal lobe.

Genus **PENTANCHUS** Smith and Radcliffe

Pentanchus SMITH and RADCLIFFE, Proc. U. S. Nat. Mus. 41 (1912) 490.

The generic characters are sufficiently indicated in the family description.

Pentanchus profundicolis Smith and Radcliffe.

Pentanchus profundicolis SMITH and RADCLIFFE, Proc. U. S. Nat. Mus. 41 (1912) 490, pl. 42; GARMAN, Mem. Mus. Comp. Zool. Harv. Coll. 36 (1913) 95.

Head long, broad, moderately depressed, one-fourth the total length; body very elongate, slender, not elevated dorsally, tapering into the long, slightly decurved tail; body and caudal peduncle much compressed; snout very long, broad, flat, tapering acutely from nostrils to its rounded tip, its undersurface flat, upper and lower sides forming a sharp edge; the wide, crescentic mouth has somewhat protruding jaws, the angles below the pupils, and with deep grooves around the angles; teeth small, numerous, erect, grooved, with a median lanceolate cusp and two smaller similar cusps on each side; nostrils very large, oblique, in posterior half of distance from mouth to end of snout; eyes small, superior; scales minute, closely imbricated and leaf-shaped, with a strong median keel and a smaller lateral one at each side; spiracles circular, minute, close to posterior angle of eye; dorsal fin over posterior end of anal, its origin midway between first gill opening and end of tail; the pectorals are large, broad, their angles rounded, and reach the much smaller ventrals; claspers cylindrical, thick, expanded at their free end, and reaching anal; caudal very long, its narrow upper lobe extending toward dorsal as a low ridge, subcaudal long, deep anteriorly and with a notch posteriorly.

Color uniform dark brown.

The type and only specimen is a male 508 millimeters long, dredged by the *Albatross* between Mindanao and Leyte, at a depth of 585 fathoms. The description given here is modified from that of Smith and Radcliffe.

ILLUSTRATION

PLATE 1. *Rhincodon typus* Smith. Drawn from a photograph of a specimen caught at Argao, Cebu, Philippine Islands, on September 14, 1914. (Drawing by M. Ligaya.)

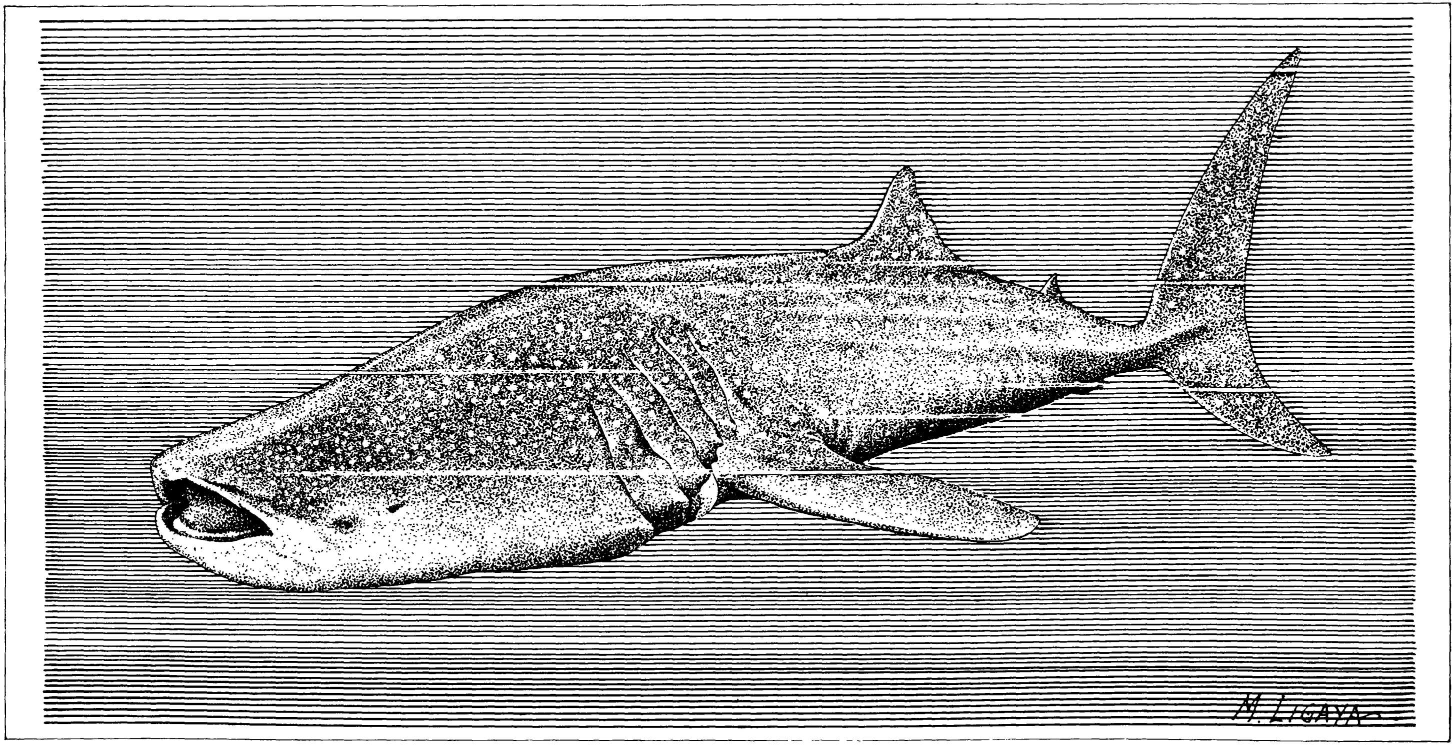

PLATE 1. RHINCODON TYPUS SMITH.

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A MONOGRAPH OF THE PACHYRRHYNCHID GROUP OF THE BRACHYDERINÆ, CURCULIONIDÆ: PART III

THE GENERA APOCYRTIDIUS HELLER AND METAPOCYRTUS HELLER

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TWELVE PLATES

The genus *Apocyrtidius* Heller contains only one species and is known only from Mount Kinabalu, Borneo.

Metapocyrtus is the largest and most intricate genus of the whole pachyrrhynchid group, partly because of the large number of species it contains and partly because of the variation in general shape exhibited in addition to the diversity of form of the two sexes of many species. The former consideration offers the more serious difficulties through the great superficial diversity in the forms of some species as well as the great superficial similarity that certain other species show to one another. However, the generic characters, as such, are only comparatively and slightly variable in all these species. In no instance do the structural variations conflict with the generic definition. A number of species exhibit truly remarkable mimicry relations to certain species of the genus *Pachyrrhynchus* Germar and to the cerambycid genus *Doliops* Waterhouse, mention of which has been made elsewhere.[1] Special mention must be made, moreover, of another phase of mimicry that is encountered among certain species of this genus. For instance, two or more species occur together in the same locality; they are found to present the same superficial general appearance as to color and scale markings, the only apparent difference, upon casual inspection, being in size. In such instances it would seem as if nature had modeled such species on a particular pattern, as a result of which the scale markings and the approximate general form show a combination which produces the effect of great general similarity. Examination of the structural characters of the rostrum, the sculpturing of the prothorax and elytra, and the sutural protuberance on the elytra make it clear that such species are developed along distinctly divergent lines. Instances of this kind of mimicry are given in the following list:

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[1] Philip. Journ. Sci. **23** (1923) 617, Table 1.

Metapocyrtus (*Artapocyrtus*) *longipenis* sp. nov. and *M.* (*Metapocyrtus*) *imitans* sp. nov., both from Bohol, Bilar.

Metapocyrtus (*Artapocyrtus*) *diffusisquamosus* sp. nov. and *M.* (*Metapocyrtus*) *adaptatus* sp. nov., both from Mindanao, Surigao Province, Surigao.

Metapocyrtus (*Metapocyrtus*) *erichsoni* Chevrolat and *M.* (*Metapocyrtus*) *gibbirostris* Waterh., both from Bohol, Bilar.

Metapocyrtus (*Metapocyrtus*) *luzonensis* sp. nov. and *M.* (*Metapocyrtus*) *gregarius* sp. nov., both from Luzon, Laguna Province, Paete.

Metapocyrtus (*Metapocyrtus*) *polilloensis* sp. nov. and *M.* (*Metapocyrtus*) *subgregarius* sp. nov., both from Polillo Island.

Metapocyrtus (*Metapocyrtus*) *diffusus* sp. nov., *M.* (*Metapocyrtus*) *subdiffusus* sp. nov., and *M.* (*Sclerocyrtus*) *celestinoi* sp. nov., all three from Samar, Wright.

Metapocyrtus (*Metapocyrtus*) *multisquamosus* Schultze and *M.* (*Sclerocyrtus*) *asper* Heller, both from Siargao.

The individual species of this genus show more or less strongly pronounced secondary sex differentiation in the form of various parts of the body, the more highly specialized characters being found in the females. This is noteworthy, since in many other Coleoptera families, as the Lucanidæ and the Dynastidæ, the more specialized characters are found in the males. In many species, in the female, the rostrum (see Plate 12, figs. 25 to 64) is dorsally swollen or bears a protuberance; in the male of the same species it is normal. In some other species the underside of the rostrum bears a subconical projection; in such cases the latter is usually more prominently developed in the female. In many species, the prothorax, besides showing sculptural differences in the two sexes is in many instances relatively much larger and more subglobular in the male. In individual species, besides sculptural differences of the elytra, there are also more or less strongly pronounced secondary sex characters in the general form; the female sex is the one favored with the more-specialized or extranormal development of the elytra, the latter usually being relatively larger and broader. In many species the female elytra have at the beginning of the apical decline a smaller or larger sutural protuberance beset with a tuft of setæ, or the apical decline is formed into a peculiar smaller or larger hump, the latter in some instances being laterally depressed. In still other species the apical termination of the female elytra is modified to form an excision, or it is beak-shaped, or produced into shorter or longer connate or divergent spines. Since the number of species involved is rather large and the characters pertaining to the general form are, in many instances, difficult to describe adequately (particularly since, among related species, these characters are a matter of relative degree) I have found it absolutely necessary to give at least schematic outline figures; these indicate also as far as possible the position of the scale markings, in lighter shades. I have made all drawings in the same relative proportion. The reproductions are intended to replace keys, and I am certain that they will serve this purpose better in the identification of the difficult species of this genus than artificial keys would. It is hoped also that they will assist particularly in the separation of the species that are known at present from the large number of species that undoubtedly will be discovered in the future in the vast, as yet unexplored regions of the Philippine Islands. In all instances the hind femora in the males extend beyond the apex of the elytra; in the females, except in species of the subgenus *Sphenomorphoidea,* they extend to or nearly to the apex. In order to show this peculiar characteristic, the hind femora are always given together in the lateral-view figures. The study of the penis structure of many species (Plate 12, figs. 1 to 24) has been continued; in numerous instances this structure has proved a helpful character in determining species. In fact, in certain species of the subgenus *Artapocyrtus* truly remarkable differences in form have been found among species which are superficially very similar in appearance (see Plate 12, fig. 13, *M.*

longipenis sp. nov., and fig. 19, *M. geniculatus* Waterhouse). The distribution of all the species of the genus *Metapocyrtus* Heller known at present is confined to the Philippines and so far the greater number is endemic to Luzon Island (see table of distribution,[2] Table 1). I have laid great stress upon and paid especial attention to recording the exact localities of the different species. Such information I consider of great importance, not only as an aid in the recognition of relationships among such highly specialized endemic species as the ones under discussion, but also for the bearing it may have as a criterion on the geologic formation of the Philippine Islands. This fact seems not to be appreciated by some authors even at the present time.

The representatives of the genus *Metapocyrtus* demonstrate in a very marked degree the relatively ancient disconnection of the various islands comprising the Philippine group; they also serve to show how the island formation, as such, directly caused or exerted an influence upon the development of so many strictly localized forms or species. As a parallel in this respect, undoubtedly caused by analogous conditions, I may mention similar occurrences of this nature among the Coleoptera of Hawaii.[3] Extreme specialization in this evolutionary process was apparently more intensified, or more rapidly advanced, by the absence of the soft wings for flying in comparatively remote periods of time.

Genus **APOCYRTIDIUS** Heller

Apocyrtidius HELLER, Stett. Ent. Zeitg. **69** (1908) 128; Philip. Journ. Sci. § D **7** (1912) 302.

Related to *Apocyrtus* Erichson; scape of antenna short, as in *Pachyrrhynchus* Germar. Eyes hemispherical, the upper edge circumscribed by a deep groove. Episternal suture of metathorax distinctly pronounced. Elytra without striæ, at base not sulcate. Femora clavate, reaching distinctly beyond apex of elytra. Tibiæ not compressed, fore tibiæ below remotely denticulate.

Type species, *A. chlorophanus* Heller, from Borneo.

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[2] Concerning the number of species of the genus *Metapocyrtus* Heller, my remarks in this respect, Philip. Journ. Sci. **23** (1923) 621, had to be considerably rectified.

[3] Sharp, Fauna Hawaiiensis **3**^{3} (1903) 177.

Apocyrtidius chlorophanus Heller.

Apocyrtidius chlorophanus HELLER, Stett. Ent. Zeitg. 69 (1908) 128.

Black, with light green scale spots; legs red, tarsi and apex of femora black. Body form similar as in *Pachyrrhynchus moniliferus* Germar, but the prothorax relatively narrower, the elytra in the male more oblong-elliptical. Rostrum one and one half times as long as broad, above the insertion of antenna a deep transverse groove and near base a second transverse groove, the latter of which is obtuse-angulate, the rostrum dorsally between the two transverse grooves with a deep oblong rectangular depression, this as well as the front sparingly beset with scales. Antenna sparsely beset with fine hair, the first funicular joint twice as long as broad, the following spherical, from the third on slightly transverse, club oval, twice as long as the diameter. Eyes hemispherical, with a very deep groove along upper edge. Prothorax globular, slightly transverse, the greatest width somewhat before the middle, the sides at anterior margin with a transverse band, the middle and the medial line sparsely beset with green scales. Elytra ovate, the puncture rows only at apex slightly depressed, irregularly beset with larger and smaller green scale spots, which form an indistinct transverse line at the middle and sometimes also subapically. At base in the second interstice a larger green scale spot seems always present. Rows of remotely apart fine whitish hair, particularly at apical region, and legs sparsely beset with fine white hair. Underside moderately densely beset with green scales, abdominal sternites in the middle glabrous, black.

Length, male, 11 millimeters; female, 13. Width, 4 to 5.

BORNEO, Mount Kinabalu (*J. Waterstradt*).

Genus METAPOCYRTUS Heller

Metapocyrtus HELLER, Philip. Journ. Sci. § D 7 (1912) 302, 337.

Type species, *M. impius* Erichson, from Luzon, Philippine Islands.

Rostrum apically not swollen, basally with a more or less strongly pronounced transverse groove. Eyes moderately convex, not bulging. Scape of antenna reaching at least to or beyond hind margin of eye. Prothorax more or less subglobular, truncate anteriorly and posteriorly, mostly with a more or less strongly pronounced anterior, and always with a posterior submarginal groove. Elytra subovate in variably modified forms, and mostly differing more or less strongly in form in the two sexes of the species. Hind femora in the female, with relatively few exceptions, not reaching beyond apex of elytra, in the male always. Heller subdivided the species of this genus into the following subgenera: *Artapocyrtus, Sphenomorphoidea, Sclerocyrtus, Orthocyrtus, Metapocyrtus, Trachycyrtus,* and *Homalocyrtus.* I separated the last named, for obvious reasons, from the genus *Metapocyrtus* Heller, raising it to generic rank. The species assigned to the above-named subgenera, although warranted for a better understanding, are in some instances more or less flexible in their characters, and certain species represent by their characters rather intermediate species between two or more subgenera. It was deemed advisable to separate a number of rather well characterized species of the subgenus *Metapocyrtus* s. str., and place them in a new subgenus for easier recognition. On account of representing more typical characters of the genus, *M. impius* Erichson should be considered the type species in preference to *M. profanus* Erichson; the description of the latter has priority, but it typifies the subgenus *Trachycyrtus* Heller.

One hundred eighty species and ten subspecies of *Metapocyrtus* Heller are recorded in this paper; thirteen of the species are without exact localities except Philippines. The distribution of these species and subspecies is well shown in Table 1.

TABLE 1.—*Distribution of the species and subspecies of the genus Metapocyrtus Heller in the Philippines.*

Locality.	Species.	Subspecies.	Locality.	Species.	Subspecies.
Batanes	2		Leyte	8	
Babuyanes	3		Biliran	4	1
Luzon	74	2	Bohol	7	
Batan, near southeastern Luzon	1		Panay	5	1
Polillo	5	1	Negros	11	
Catanduanes	2		Dinagat	3	
Mindoro	3	1	Siargao	6	
Sibay	1		Bucas	4	1
Ticao	1		Mindanao	25	
Romblon	2		Samal		1
Sibuyan	3		Sulu Islands	2	
Samar	12	1	Busuanga		1
			Palawan	1	

Subgenus **Artapocyrtus** Heller

Artapocyrtus HELLER, Philip. Journ. Sci. § D 7 (1912) 302, 338.

Rostrum relatively short, as long as broad, squarish or trapezoidal, the sides set off at right angles from the dorsal surface, arched lengthwise and separated from the curved front by a prominent transverse groove. Underside of rostrum in some species with a conical projection. Elytra of females near base laterally mostly with a shallow subhumeral depression.

The typical species of this subgenus is *Metapocyrtus* (*Artapocyrtus*) *bifasciatus* Waterhouse from Mindanao.

Metapocyrtus (Artapocyrtus) bifasciatus Waterhouse. Plate 2, fig. 1, ♂, fig. 2, ♀ (lateral view).

Apocyrtus bifasciatus WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 307.

Metapocyrtus (*Artapocyrtus*) *bifasciatus* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 338.

Black, with greenish golden scale markings, femora and tibiæ reddish brown except near apex. Rostrum as long as broad, dorsally convex, irregularly scatteredly punctured with a short medial groove near base. The transverse basal groove prominent. Front finely and sparsely punctured with some scattered scales and a more sharply defined medial groove. Prothorax subglobular, rather coarsely and irregularly confluently punctured. A narrow irregular band of greenish golden scales at anterior margin confluent with a scale patch at each lateral margin. Elytra subovate, in the male rather coarsely and regularly striate-punctate, in the female the punctures finer, more irregular, and dorsally in the basal half the surface finely rugose. Apical sutural decline in female forming a very prominent, laterally depressed hump; in the latter sex also at base laterally a rather well-pronounced roundish tubercle. Both sexes with a transverse, greenish golden scale band at base which broadens toward margin, and another at apical third; both of these bands more or less connected by a scale stripe along margin.

Male, length, 11 millimeters (without rostrum); width, 4.5. Female, length, 11.8 millimeters (without rostrum); width, 4.8.

MINDANAO, exact locality unknown.

I received from the British Museum a male specimen of the above typical form of *A. bifasciatus* Waterhouse which was compared with the type by Mr. Arrow. Other specimens which differ considerably from the typical form in sculpture, I designate herewith as:

Metapocyrtus (Artapocyrtus) bifasciatus var. **butuanensis** var. nov.

Glossy black, with pale greenish scale markings with a slight violet sheen. Prothorax in male very finely, almost obsoletely scatteredly punctured; in female, the punctures well pronounced but rarely confluent. Elytra with the markings similar; in the female each elytron in the middle dorsally with a small scale spot; in both sexes the punctures more regular and finer than in the typical form.

MINDANAO, Agusan Province, Butuan (*C. F. Baker*).

This variety has superficially a rather strong resemblance to *A. violaceus* Schultze which fact was misleading to Heller[4] and myself,[5] but that species is well differentiated from the variety by the form of the elytra.

The rather meager original description of Waterhouse, which refers undoubtedly to a male specimen only, is as follows:

Apocyrtus bifasciatus.

> Ap. niger; pedibus piceo-rubris, genibus tarsisque nigrescentibus; capite inter oculos depresso et canaliculo longitudinali super rostrum ducto; rostro parcè punctato; thorace globoso, rugoso-punctato; elytris oblongo-ovatis, thorace paulò latioribus, distincte punctatis: capite maculâ viridi inter oculos et utrinque infra oculos ornato; thorace margine antico lateribusque viridibus; elytris distinctè punctatis, fasciis duabus latis transversalibus ornatis; his maculis fasciisque è squamis splendidè aureo-viridibus effectis. Long. corp. 6 lin.; lat. 2¼ lin.

The two broad transverse fasciae on the elytra of this species (one of which is at the base and the other behind the middle) are almost joined by a series of brilliant scales on the sides of the wing-cases: there is a brilliant spot on each side of the abdomen between the middle and posterior pairs of legs.

Metapocyrtus (Artapocyrtus) violaceus Schultze. Plate 2, fig. 3, ♂, fig. 4, ♀ (lateral view); Plate 12, fig. 17.

Metapocyrtus violaceus SCHULTZE, Philip. Journ. Sci. 15 (1919) 556, pl. 1, fig. 9, 9*a*, ♀; 21 (1922) 584.

Black, with violet scale markings. Rostrum irregularly punctured, separated by a strongly pronounced transverse groove at base, in basal half a well-defined medial groove which is continued on front; the latter sparsely punctured and with a few scattered scales. Prothorax slightly longer than broad, the greatest width before the middle, strongly coriaceous, with a fine anterior and more-pronounced posterior submarginal groove, an anterior marginal band and an irregular patch of violet scales at each lateral margin. Elytra coarsely, irregularly striate-punctate, the punctures confluent toward the lateral margins, particularly in the female. In the latter the elytra at apical third laterally strongly compressed, the posterior slope at suture produced and bulging, forming a distinct hump; in the male the posterior decline evenly rounded. At base a rather broad band of violet scales and another transverse band at apical third interrupted at suture. Besides these markings the female has in the middle near the lateral margins an irregular violet scale spot. Apically the margins in both sexes finely setose. Legs dark castaneous, sparsely punctured and finely setose.

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[4] Entomol. Mitteil. 10 (1921) 197.

[5] Deutsche Ent. Zeitschr. (1922) 45.

Male, length, 10 to 12 millimeters (without rostrum); width, 4 to 4.5. Female, length, 11 to 13.5 millimeters (without rostrum); width, 4.8 to 5.3.

SIARGAO (*W. Schultze*).

This species seems to be confined in its distribution to the above locality since it was not found on the near-by islands of Bucas Grande or Dinagat, nor on the main island of Mindanao. On Bucas Island it seems to be replaced by *M. bucasanus* Schultze; on Mindanao, by *M. bifasciatus* Waterhouse. In 1921 Heller[6] concluded, upon limited material, that *M. violaceus* was identical with *M. bifasciatus;* relying upon his judgment I[7] published a note to that effect also. Lately I received a specimen of *M. bifasciatus* from the British Museum, through the kindness of Mr. Arrow who compared it with the type. I found that the species involved are related but distinct, in sculpture as well as in the color of the scale markings. The punctures on the elytra in *M. violaceus* are much more irregular than in *M. bifasciatus,* and the scale markings in the latter species are golden greenish.

Metapocyrtus (Artapocyrtus) quadriplagiatus Roelofs. Plate 3, fig. 11, ♂, fig. 12, ♀ (lateral view).

Apocyrtus quadriplagiatus ROELOFS, Compt. Rend. Soc. Ent. Belg. (1876) 7.

Metapocyrtus (*Artapocyrtus*) *quadriplagiatus* Roelofs, HELLER, Philip. Journ. Sci. § D 7 (1912) 338, pl. 1, figs. 4, 4*a*.

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[6] Entomol. Mitteil. 10 (1921) 197.

[7] Deutsche Ent. Zeitschr. (1922) 45.

Glossy black, each elytron with two very large pinkish or pale reddish metallic scale spots. Rostrum about as long as broad, dorsally convex, finely and scatteredly punctured, with a medial groove in basal half, continued on front, and a strongly pronounced transverse groove at base. Rostrum ventrally with a conical projection pointing posteriorly. Front finely and sparsely punctured. Prothorax subglobular, finely and scatteredly punctured, with an anterior and a posterior submarginal groove. Dorsally behind the middle, in the female only, a small and indistinct flattish depression bearing transverse wrinkles. Along anterior margin a narrow scale band, along posterior margin some scattered scales, and at lateral margins an irregular, pale blue scale patch. These markings are less pronounced in the male, or may be absent entirely. Elytra coarsely and irregularly striate-punctate. Each elytron in both sexes with two very large pinkish or pale reddish metallic scale spots, one at basal third, the other at apical third. In the female usually another small oblong spot in the middle dorsally, between the second and third puncture rows. Legs finely and sparsely setose.

Male, length, 9.5 to 11 millimeters (without rostrum); width, 4 to 4.5. Female, length, 11 to 12 millimeters (without rostrum); width, 5.5 to 5.8.

LUZON, Laguna Province, Paete (*R. C. McGregor; Schultze*); Rizal Province, Mount Lumutan (*M. Ramos*).

Roelofs in his original description of this species gives the size as "6 mill."; among the large amount of material at my disposal I have not found a single specimen of such a small size.

Metapocyrtus (Artapocyrtus) quadriplagiatus var. **biplagiatus** var. nov. Plate 3, fig. 11, ♂.

From the vicinity of Paete I received several specimens which have only one moderately large spot on each elytron, at the basal third, representing this well-defined variety.

Metapocyrtus (Artapocyrtus) octomaculatus Schultze. Plate 3, fig. 15, ♂, fig. 16, ♀ (lateral view); Plate 12, fig. 33, ♂, fig. 34, ♀ (head).

Metapocyrtus (*Artapocyrtus*) *octomaculatus* SCHULTZE, Philip. Journ. Sci. 21 (1922) 583, pl. 1, fig. 10, ♂.

Glossy black, each elytron with four large pale pink scale spots. Related to *M. sexmaculatus* Schultze and *M. quadriplagiatus* Roelofs, but closest to the latter species. Rostrum short and convex, dorsally scatteredly punctured, at base with a deep transverse groove, in basal half with a medial groove, the latter continued on front. Rostrum ventrally with a conical projection similar as in *M. quadriplagiatus*. Prothorax subglobular, finely, sparsely, and scatteredly punctured, with an anterior and a posterior submarginal groove and an irregular band at anterior and posterior margin confluent with an irregular scale stripe at lateral margins. Elytra rather coarsely and irregularly striate-punctate. In both sexes each elytron at basal and apical third with two large irregular scale spots forming transverse rows.

Male, length, 10 to 11 millimeters (without rostrum); width, 4.3 to 4.7. Female, length, 11.5 millimeters (without rostrum); width, 5.5.

POLILLO (*Schultze*).

Metapocyrtus (Artapocyrtus) sexmaculatus Schultze. Plate 3, fig. 13, ♂, fig. 14, ♀ (lateral view); Plate 12, fig. 27, ♂, fig. 28, ♀ (head).

Artapocyrtus sexmaculatus SCHULTZE, Philip. Journ. Sci. § D 12 (1917) 256, pl. 1, figs. 11, 11*a*.

Glossy black, prothorax and elytra with pale pinkish white scale markings. Rostrum, ventrally without conical projection, dorsally densely punctured with a sharply pronounced medial groove in basal half, rostrum separated at base from front by a deep transverse groove, the medial groove continued the whole length of front, latter sparsely and scatteredly punctured. Prothorax equal in length and width, subglobular, with a sharply defined anterior and posterior submarginal groove, finely and scatteredly punctured. Female dorsally behind middle with an indistinct flattish depression, finely and transversely wrinkled. Lateral margins in both sexes with an irregular, rather small scale spot. Elytra irregularly striate-punctate. Each elytron in male with two spots, one at base near lateral margin, the other at apical third dorsolaterally. Female, each elytron with three or four spots, two of which are in a similar position as in the male; one other small spot in the middle dorsally between second and third puncture rows and still another small spot (sometimes absent) at lateral margin at apical third. Anal sternite in male densely and coarsely punctured, in female with a strong depression toward each side, forming a triangular ridge in the middle. Hind femora extending slightly in the female, in the male much, beyond apex of elytra.

Male, length, 10.5 millimeters (without rostrum); width, 4.5. Female, length, 11.5 millimeters (without rostrum); width, 5.

CATANDUANES, Virac (*Schultze*).

Metapocyrtus (Artapocyrtus) pardalis Heller. Plate 3, fig. 18, ♀ (lateral view).

Metapocyrtus (*Artapocyrtus*) *pardalis* HELLER, Philip. Journ. Sci. § D 7 (1912) 341, pl. 1, figs. 5, 5*a*; KUNTZEN, Deutsche Ent. Zeitschr. (1914) 452.

Black, glossy, prothorax and elytra with large pale reddish or greenish scale spots. Rostrum short, not longer than broad, strongly convex, rather densely punctured, with a deep medial groove in basal half, separated by a deep transverse groove at base from front. The latter groove does not break through the dorsolateral edge of rostrum. Front sparsely and scatteredly punctured with a fine medial groove and an irregular scale spot. Prothorax as long as broad, subglobular, dorsally rather coarsely scatteredly punctured, toward sides and base the punctures become gradually obliterated, dorsally near base finely and transversely wrinkled, with an anterior marginal band, a dorsolateral spot slightly behind middle and a large scale patch at each lateral margin. Elytra coarsely and slightly irregularly striate-punctate. Suture at apical slope with a few scattered hairs. Each elytron with eight moderately large scale spots as follows: Two at base; two at middle; three form an irregular cross row at apical third, of which the dorsolateral one is very large, the lateral marginal one elongate, and the small one between them is placed slightly posteriorly; a more or less triangular spot near apex. Metasternum and first abdominal sternite laterally with a large scale patch. Anal sternite of female laterally strongly and deeply depressed, forming a triangular ridgelike projection in the middle.

Female, length, 11.5 millimeters (without rostrum); width, 5.

MINDANAO, Agusan Province, Butuan (*C. M. Weber*).

The locality Luzon (Semper) mentioned by Kuntzen on specimens in the Berlin Museum I consider erroneous.

Metapocyrtus (Artapocyrtus) bucasanus Schultze. Plate 2, fig. 5, ♂, fig. 6, ♀ (lateral view).

Metapocyrtus bucasanus SCHULTZE, Philip. Journ. Sci. 15 (1919) 556, pl. 1, fig. 10, ♀.

Black, with scattered bluish white scales. Head, prothorax, and elytra similar in form and sculpture to *M. violaceus* Schultze but somewhat stouter in build; particularly in the female the elytra are not compressed laterally at apical third although the suture at posterior slope is swollen, forming a more or less produced ridge. Prothorax strongly coriaceous but more rugose, with an anterior marginal band of scattered scales. Lateral margins beset with scattered scales, which form a more or less condensed patch. Elytra very coarsely and irregularly striate-punctate, also with scattered scales, which are condensed in certain places, forming indistinct patches or spots in both sexes basally and at apical third; female, besides, with two small indistinct spots, one located in the middle subsuturally, the other near lateral margin. In the male the scales are more uniformly scattered. Along the posterior-sutural slope in the female a few rather long scattered hairs, both sexes apically finely setose. Legs castaneous, sparsely punctured, and finely setose.

Male, length, 10 to 12 millimeters (without rostrum); width, 4 to 4.5. Female, length, 11.8 to 13.5 millimeters (without rostrum); width, 5 to 5.8.

BUCAS GRANDE (*Schultze*).

This species seems to be confined to the above locality in its distribution. It resembles superficially *M. derasocobaltinus* Heller, but the latter species is readily distinguished by the conical projection on the underside of the rostrum, which is wanting in the former.

Metapocyrtus (Artapocyrtus) samarensis sp. nov. Plate 2, fig. 7, ♂, fig. 8, ♀ (lateral view); Plate 12, fig. 31, ♂, fig. 32, ♀ (head).

Glossy black, with some scattered grayish blue scales, femora and tibiæ reddish brown except near apex. Related to *M. derasocobaltinus* Heller and *M. bucasanus* Schultze, but smaller and slenderer. Rostrum slightly longer than broad, dorsally convex, scatteredly punctured, a strongly pronounced medial groove in basal half, the latter crossing the transverse basal groove and continued on front. Latter more sparsely and finely punctured, with some scattered scales. Rostrum ventrally with a strongly pronounced conical projection. Prothorax subglobular, slightly broader than long, in the female irregularly diffusedly punctured, in the male the punctures more obliterated and subrugose, the sculpture much less pronounced. In some specimens scattered scales along anterior and posterior margins, and an irregular patch at each lateral margin. Elytra subovate, coarsely and rather regularly striate-punctate; in the female with an irregular depression at base laterally and a small roundish tubercle; some scattered scales basally at sides, in some specimens forming somewhat denser but indistinct transverse patches in the middle and at apical third. Penis structure, Plate 12, fig. 15.

Male, length, 9.8 to 10 millimeters (without rostrum); width, 3.8 to 4. Female, length, 10.7 millimeters (without rostrum); width, 4.6.

SAMAR, Borongan (*Schultze*).

Some specimens of this species are absolutely bare of any scales, although not old or rubbed off.

Metapocyrtus (Artapocyrtus) geniculatus Waterhouse. Plate 2, fig. 19, ♂ (lateral view).

> *Apocyrtus geniculatus* WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 307; 11 (1843) 247; HELLER, Philip. Journ. Sci. § D 7 (1912) 339.

Black, with scattered pale blue scales on prothorax and elytra, femora and tibiæ red except near apex. Rostrum slightly longer than broad; dorsally convex and scatteredly punctured, in basal half with a sharply defined medial groove, the latter crossing the transverse basal groove and continued on front; rostrum ventrally with a distinctly swollen medial ridge (male). Prothorax subglobular, as long as broad, irregularly confluently punctured and subrugose, the sculpture gradually glabrous toward and at lateral margins, fine pale blue scales scattered over surface but more condensed at lateral margins. Elytra subovate, irregularly striate-punctate, the punctures rather coarse. At base and subapically a very indistinct fascia consisting of scattered pale blue scales, producing a cloudy effect. Penis structure, Plate 12, fig. 19.

Length, male, 10.6 millimeters (without rostrum); width, 4.5.

Philippines, exact locality unknown.

The above description and the lateral-view and penis-structure figures are based on a single male specimen loaned by the British Museum; the specimen was compared with the type by Mr. Arrow. I prefer to give also the original description herewith:

Apocyrtus geniculatus.

> Ap. niger; femoribus, tibiisque rufis, genibus nigris; capite punctato, sulco longitudinali impresso; thorace subgloboso, anticè posticèque truncato, suprà punctis distinctis confluentibus impresso; elytris thorace distinctè latioribus, ovatis, posticè paulò acuminatis, punctatis, punctis confluentibus atque subseriatis.

> posticè aliquantò repentè contractis, ad suturam elevatis et tuberculo instructis, ad latera propè basin depressis. Thorax ad latera squamis cæruleis adspersus. Elytra fasciâ non valdè distinctâ subapicali, lateralibusque cæruleis. Long. corp. 6¾–5 lin.; lat. 2¾–2 lin.

This species much resembles the Ap. bifasciatus, but the thorax is narrower and more thickly and distinctly punctured, and the elytra are also more thickly punctured. As in Ap. bifasciatus, there is sometimes a basal and subapical fascia on the elytra, but these in most specimens can scarcely be traced, and are never distinct; they are formed by scattered pale blue scales. In one sex there is a tubercle on the hinder part of the elytra situated on the suture, and behind this tubercle is a brush of minute hairs. At the base of the elytra is a depression on each side, and a small hump near the humeral angle. The punctures of the elytra in some specimens are confluent and give a rough appearance to the surface; in others they are arranged into moderately regular striae. The legs are almost of an orange colour; the coxae, knees, tip of the tibiae, and the tarsi are black.

Particular attention is called to the extraordinary form of the penis structure of this species, as well as to that of *A. longipenis* sp. nov. The structure in both is entirely different from the other *Metapocyrtus* species and bears a resemblance relatively closest to the species of the genera *Apocyrtus* and *Pseudapocyrtus.*

Metapocyrtus (Artapocyrtus) longipenis sp. nov. Plate 6, fig. 23, ♀, fig. 24, ♂ (lateral view); Plate 12, fig. 25, ♂, fig. 26, ♀ (head).

Black, with scattered pale greenish bronze scales; femora and tibiæ red, except apically. Nearly related to *A. geniculatus* Waterhouse. Rostrum very similar to the latter, but more densely punctured dorsally and on front, fine whitish hair arising from the punctures. Prothorax subglobular, densely, irregularly, and confluently punctate with scattered pale greenish scales all over surface. Elytra elongate subovate, irregularly striate-punctate, with scattered greenish scales which are more numerous and denser near base and lateral margins and form at apical third a diffused but more-pronounced fascia than in *geniculatus.* Female, laterally at base with a depression and a prominent roundish tubercle or hump near humeral angle, apical sutural decline without any tubercle, but with a few setæ along suture. Last abdominal sternite in the male coarsely punctured, in the female with a deep emargination and a groovelike medial depression, terminating in two elongate triangular projections. The penis structure, Plate 12, fig. 13, shows plainly the extraordinarily elongate form of this organ which is larger but similar to the smaller penis structure of *Metapocyrtus (Artapocyrtus) geniculatus* Waterhouse, Plate 12, fig. 19.

Male, length, 11 to 11.6 millimeters (without rostrum) ; width, 4.6 to 4.8. Female, length, 12.3 to 13.8 millimeters (without rostrum) ; width, 5.5 to 5.8.

BOHOL, Bilar (*A. Duyag*).

Metapocyrtus (Artapocyrtus) longipenis var. **leytensis** var. nov.

The sculpture on prothorax and elytra more irregular; scales pale blue; elytra relatively shorter in both sexes and more abruptly tapering toward apex than in typical *longipenis*. The penis structure shows no appreciable difference from that of the latter.

Male, length, 11.2 millimeters (without rostrum) ; width, 4.7. Female, length, 11.4 to 11.6 millimeters (without rostrum) ; width, 5 to 5.2.

LEYTE, Palompon (*V. Elicaño*).

Metapocyrtus (Artapocyrtus) longipenis var. **biliranensis** var. nov. Plate 2, fig. 18, ♀ (lateral view).

Elytra with the sculpture much coarser and more confluent; scales pale blue.

Length, female, 14 millimeters (without rostrum) ; width, 5.9.

BILIRAN (*McGregor*).

Metapocyrtus (Artapocyrtus) humeralis Heller. Plate 6, fig. 12, ♂, fig. 13, ♀ (lateral view).

Metapocyrtus (Artapocyrtus) humeralis HELLER, Philip. Journ. Sci. § D 7 (1912) 340; KUNTZEN, Deutsche Ent. Zeitschr. (1914) 452.

Black; prothorax and elytra with very pale grayish or bluish scale markings. Legs red, except apical parts of femora and tibiæ, tarsi entirely black. Rostrum as long as broad, convex, scatteredly punctured, with a well-defined medial groove in basal half and a strongly pronounced transverse groove at base. Front sparsely and scatteredly punctured, also with medial groove. Prothorax subglobular, dorsally coarsely and irregularly confluently punctate, the sculpture more pronounced in the female, but gradually glabrous toward lateral margins in both sexes. A narrow anterior marginal band confluent with a large scale patch at lateral margins. Elytra oblong-ovate, very coarsely and irregularly striate-punctate, female at humeral area with a large but shallow depression bearing a large obtuse tubercle, a double tubercle at the beginning of the sutural apical decline. The apical sutural decline in the male gradual, in the female more abrupt, beset with a few setae. A transverse scale band near base, extending obliquely to lateral margins; another transverse scale band at apical third, which is (female) mostly confluent with an ill-defined spot near the middle at lateral margin. Underside sparsely setose; mesosternum, metasternum, and first and second abdominal sternites laterally with an irregular scale patch.

Male, length, 9.8 to 10 millimeters (without rostrum); width, 4.2 to 4.5. Female, length, 10.8 to 11.3 millimeters (without rostrum); width, 4.8 to 5.

LEYTE.

I received four specimens of this species from the British Museum without exact locality, labeled Philippines. The locality Luzon (Semper) mentioned by Kuntzen seems very doubtful and should be disregarded until verified again.

Metapocyrtus humeralis aureofasciatus subsp. nov. Plate 6, fig. 21, ♀, fig. 22, ♂ (lateral view).

Black; prothorax and elytra with brilliant golden scale markings; legs dark red except femora and tibiæ apically, tarsi black; front more sparsely scatteredly punctured, with an irregular scale spot, the medial groove much finer than on rostrum. Prothorax as long as broad, dorsally coarsely and confluently punctured, almost rugose, which sculpture becomes obsolete toward lateral margins. An irregular scale band at anterior margin confluent with a large scale patch at each lateral margin, the latter reaching to base. Elytra similar in general form to the typical *M. humeralis* Heller, very coarsely and irregularly striate-punctate, with a broad transverse golden scale band at base and at apical third, both bands confluent along lateral margin with an irregular marginal stripe. Female, in addition to the scale markings mentioned, in some specimens with only an irregular scale spot in the middle subsuturally. Elytra in female at the beginning of apical decline with a double tubercle, but this more pronounced and more strongly acute than in typical *M. humeralis;* arising from the tubercles are a few long setæ and a few more are located behind these at suture. Apical region of elytra in both sexes with scattered, small, pale greenish setæ. The penis structure is similar in form to *M. longipenis* sp. nov., but smaller.

Male, length, 10.5 to 12 millimeters (without rostrum) ; width, 4.5 to 5. Female, length, 11.8 to 12.7 millimeters (without rostrum) ; width, 5.3 to 5.4.

SAMAR, Wright, Loquilocon (*McGregor*) and two males from the British Museum, with locality Philippines (*Cuming ?*).

This striking form I recognized and described as new at first, from the two male specimens from the British Museum. After these were returned, my friend Mr. McGregor returned from a very successful collecting trip on Samar Island (June and July, 1924) bringing with him a large series of this subspecies; his collection enabled me to make the description of this as well as of nine other species of *Metapocyrtus* and one species of *Homalocyrtus* more nearly complete. This subspecies is at once distinguished from the typical *M. humeralis* by the pale golden scale markings in contrast to the pale pinkish or bluish gray markings of the latter.

Metapocyrtus (Artapocyrtus) derasocobaltinus Heller. Plate 11, fig. 14, ♂, fig. 15, ♀ (lateral view).

Metapocyrtus (*Artapocyrtus*) *derasocobaltinus* HELLER, Philip. Journ. Sci. § D 7 (1912) 338, 339.

Black; prothorax and elytra dorsally more or less densely beset with cobalt blue scales which change toward the lateral margins to brilliant greenish golden; legs red, except femora and tibiæ apically, tarsi black. Rostrum as long as broad, dorsally strongly convex, moderately densely punctured with a rather deep medial groove in basal half. Basal transverse groove deep, not interrupting the dorsolateral edges. Front sparsely and indistinctly punctured, with a fine medial groove. Scattered greenish golden scales on rostrum basally, extending to front. Sides of rostrum with a small triangular depression, which is formed by the swollen upper edge of the scrobe and the dorsolateral edge of the former. Rostrum ventrally with a strongly developed conical projection. Sides of head below eye with a large patch of golden scales and scalelike hair. Prothorax slightly broader than long, sides uniformly rounded, and with well-pronounced anterior and posterior submarginal groove, the surface very irregularly rugosely punctured, the wrinkles toward base more transverse. In the male the discal part of prothorax and for some distance dorsolaterally with more or less densely scattered cobalt blue scales, but along anterior and posterior margin an irregular band confluent with a large patch at each side consisting of greenish golden scales. In the female the blue scales discally are only scarcely indicated and the bands of golden scales at anterior and posterior margin are dorsally mostly interrupted. Elytra oblong-ovate, stouter in the female and basilaterally with an indistinct shallow depression and an obtuse tubercle. In the male the elytra rather regularly striate-punctate, in the female more irregularly; dorsal region in male rather densely and more uniformly beset with cobalt blue scales, except along suture, toward sides and along the lateral margins the scales are greenish golden. In the female elytra, dorsally, the blue scales are much less numerous and less evenly distributed. Apical decline (female) with a sutural row of yellowish setæ and some scattered shorter yellowish hair at the lateral region apically. Mesosternum, metasternum, and first abdominal sternite laterally with a patch of golden scales. Hind femora in the female reaching very slightly beyond apex of elytra, in the male well beyond.

Male, length, 10.7 to 12.7 millimeters (without rostrum); width, 4.1 to 5.1. Female, length, 11.5 to 14.4 millimeters (without rostrum); width, 5.1 to 6.1.

SAMAR, Wright (*McGregor*).

Heller described this species from two female specimens and assumed that the cobalt blue was caused by deterioration of the metallic golden green color. This assumption is not substantiated by my examination of the large series of perfectly fresh specimens collected by Mr. McGregor. The males show the cobalt blue scale markings in a much stronger degree and this color has a peculiar enamel effect. This species, on account of its striking markings, represents one of the most beautiful species of the genus.

Metapocyrtus (Artapocyrtus) diffusisquamosus sp. nov. Plate 2, fig. 9, ♂, fig. 10, ♀ (lateral view); Plate 12, fig. 29, ♂, fig. 30, ♀ (head).

Black with scattered pale bluish white or greenish white scales, femora and tibiæ red, except near apex. Related to *M. derasocobaltinus* Heller. Rostrum about as long as broad, dorsally convex, scatteredly punctured, with a medial groove in basal half crossing the transverse basal groove and extending to front, the latter irregularly punctured and beset with some scattered scales. Rostrum ventrally with a well-pronounced conical projection. Dorsolateral edge of rostrum and upper edge of antennal scrobe strongly swollen, inclosing a triangular depression before eye. Sides of head more or less strongly beset with scattered hairlike scales and true scales. Prothorax subglobular, slightly broader than long, irregularly confluently and subrugosely punctured, the sculpture much coarser and more pronounced in the female, with irregularly scattered scales all over surface but more condensed at lateral margins. Elytra subovate; in the female near base laterally with a shallow subhumeral depression; coarsely and irregularly striate-punctate, more strongly in the female, with irregularly scattered scales which are more condensed toward lateral margins and at apical third, particularly in the female. Apical sutural decline in both sexes with a few yellowish setæ. Last abdominal sternite in the male coarsely scatteredly punctured, in the female smooth with a triangular swelling in the middle at anterior margin, toward outer margin depressed. Hind femora in the female reaching slightly beyond, in the male well beyond apex of elytra. Penis structure, Plate 12, fig. 16.

Male, length, 10 to 11.4 millimeters (without rostrum); width, 3.9 to 4.4. Female, length, 11 to 11.8 millimeters (without rostrum); width, 4.8 to 5.

MINDANAO, Surigao, Surigao (*Schultze*); LEYTE, Cabalian (*M. Ramos*).

Subgenus **Sphenomorphoidea** Heller

Sphenomorphoidea HELLER, Philip. Journ. Sci. § D 7 (1912) 302, 342.

Small to medium-sized species. Rostrum longer than broad, toward apex slightly divergent, dorsally convex, separated from front by a deep transverse basal groove. Front slightly curved. Anterior margin of prothorax ventrally slightly emarginate; prothorax furthermore with a distinct anterior submarginal groove. Elytra in both sexes similar in general form, and in the female without any special secondary sexual character; hind femora in both sexes extending beyond apex of elytra, but farther beyond in the male.

Typical species of this subgenus, *M. metallicus* Waterhouse.

Metapocyrtus (Sphenomorphoidea metallicus Waterhouse. Plate 3, fig. 8, ♀ (lateral view) ; Plate 12, figs. 43, 44.

Apocyrtus metallicus WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 305.

Metapocyrtus (*Sphenomorphoidea*) *metallicus* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 342.

Glossy, dark brownish or greenish coppery of a burnished hue, prothorax and elytra with pale greenish golden scale spots. Rostrum dorsally convex, scatteredly punctured, with a strongly pronounced medial groove and separated from front by a very deep transverse basal groove. Front sparsely and indistinctly punctured with a fine but sharp medial groove. Prothorax subglobular, with a well-defined anterior and posterior submarginal groove, uniformly sparsely punctured with a transverse scale spot dorsolaterally at anterior and in some specimens also at posterior margin, another larger scale patch at each lateral margin and dorsolaterally, slightly behind middle, between anterior and posterior margins a small roundish spot. Elytra stout subovate, with regular rows of punctures, the latter rather coarse. Each elytron with eight or nine roundish scale spots forming transverse rows; two near base, two or three in the middle, three anteapically and one at apex. Metasternum and first abdominal sternite with a scale spot laterally.

Male, length, 7.4 to 9 millimeters (without rostrum) ; width, 3.2 to 4. Female, length, 7.5 to 11.7 millimeters (without rostrum) ; width, 3.3 to 5.8.

LEYTE, Palompon (*Elicaño*) ; Tacloban (*Schultze*). BILIRAN (*McGregor*). SAMAR, Catarman (*Frost*) ; Wright (*McGregor*).

This is an extremely variable species in general color, scale markings, and size; the following variations can be recognized, but between these, intermediate and intergrading forms occur rather frequently.

Metapocyrtus (Sphenomorphoidea) metallicus var. suavis Heller.

Metapocyrtus metallicus var. *suavis* HELLER, Philip. Journ. Sci. § D 7 (1912) 342.

Dorsolateral spots near middle of prothorax absent, general color of elytra black, or prothorax and elytra dark reddish coppery.

SAMAR, Wright (*McGregor*).

Metapocyrtus (Sphenomorphoidea) metallicus var. sphenomorphoides Heller. Plate 3, fig. 4, ♂ (lateral view).

Metapocyrtus metallicus var. *sphenomorphoides* HELLER, Philip. Journ. Sci. § D 7 (1912) 343.

Elytra with the middle transverse row of spots (two or three on each elytron) confluent, forming a transverse band. I received specimens of the typical form as well as of this variation from the first of the localities mentioned for the species. Two other specimens I received from the British Museum, bearing the locality label "N. Luzon;" this locality I must consider as erroneous until it can be verified again.

Metapocyrtus (Sphenomorphoidea) metallicus var. mutabilis var. nov.

Spots on elytra rather large, in the middle row the two spots nearest to lateral margin mostly confluent, anteapical row also mostly confluent and more or less connected with a marginal stripe along apical third and the latter confluent at apex with a subsutural stripe, so that at apical third of each elytron a triangular marking is formed.

SAMAR, Wright (*McGregor*).

Examination of a large series recently received shows distinctly that the specimens from Samar are considerably larger than those from the other localities given.

Metapocyrtus (Sphenomorphoidea) laevicollis Waterhouse. Plate 3, fig. 17, ♀ (lateral view).

Apocyrtus laevicollis WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 305.

Metapocyrtus (*Sphenomorphoidea*) *metallicus* var. *laevicollis* HELLER, Philip. Journ. Sci. § D 7 (1912) 343.

Glossy coppery brown, elytra with pale green scale markings. Rostrum strongly divergent toward apex, separated from front at base by a well-pronounced transverse groove. Dorsal surface of rostrum longitudinally convex, sparsely punctured and with a distinct longitudinal medial groove. Front and vertex of head sparsely punctured. Prothorax as broad as long with distinct anterior and posterior submarginal groove. Lateral margins with an irregular scale spot. Elytra ovate, strongly and regularly punctate-striate, the punctures coarse. Each elytron with a broad basal transverse scale band reaching from first puncture row to lateral margin, another transverse band in the middle not quite reaching to lateral margin. At apical fourth an irregular broad longitudinal stripe between third and fifth interstices extending to apex where it becomes confluent with a short abbreviated marginal stripe, the latter mostly absent in the male. Apex of elytra in the female forming a small obtuse projection, in the male evenly rounded. Metasternum and first abdominal sternite with a large scale patch laterally. Femora in both sexes extending well beyond apex of elytra, but more so in the male.

Male, length, 7.3 millimeters (without rostrum); width, 3. Female, length, 7.4 to 9 millimeters (without rostrum); width, 3.5 to 4.2.

SAMAR, Catarman (*R. L. Frost*).

Specimens of this species and of *M. metallicus* Waterhouse were kindly compared by Mr. Arrow with the type specimen in the British Museum and forwarded to me. Heller considered the above species to be a variety of *M. metallicus* with which opinion, after examining a series of specimens of both species, I cannot agree. *Metapocyrtus laevicollis* Waterhouse is a distinct and well-characterized species, related to *M. metallicus*.

Metapocyrtus (Sphenomorphoidea) 14-punctatus Heller.

Metapocyrtus (*Sphenomorphoidea*) *14-punctatus* HELLER, Philip. Journ. Sci. § D 7 (1912) 343.

This species, known to me from the original description only, seems to be closely related to *M. metallicus* Waterhouse. Heller's description is given, as follows:

Niger, punctis viridi-auratis ornatus; rostro latitudine sesqui longiore, dorso convexo, lateribus parallelis, in dimidia parte basali linea mediana impressa ac utrinque pone marginem lateralem sulco obsoleto; prothorace globoso, subtilissime coriario et sat crebre punctato; margine antico utrinque maculaque utrinque pone medium punctiformi, aurato-squamosis; elytris prothorace paulo latioribus regulariter fortiterque seriato-punctatis, singulis maculis rotundatis septem, oculi magnitudine, et quidem quatuor basalibus inter striam septimam et nonam, una basali, altera apicali inter striam nonam et decimam; corpore subter glabriusculo, femoribus elytrorum apice superantibus, tibiis posticis distincte compressis, in triente apicali incurvatis.

Long. 7.5–9.8, lat. 3.5–4.5 mm.

Patria: Insulae Philippinae, Br. M. et M. Dr. ex coll. *Fry* 33294.

Schwarz, Flügeldecken mit 14 rötlich, oder grünlich goldigen Schuppenmakeln, von ungefähr Augengrösse. Rüssel 1½ mal so lang wie breit, der Länge nach gewölbt, mit parallelen, scharfen Seitenkanten, ziemlich dicht und kräftig punktiert, in der Basalhälfte mit eingedrückter Mittellinie und beiderseits innerhalb des Seitenrandes mit mehr oder weniger deutlichem Längseindruck. Rüsselseiten vor den Augen mit Längseindruck, Fühler rötlich braun, der Schaft nach der Spitze zu etwas verbreitert und flach gedrückt, das 1. Geisselglied länger als das 2. die folgenden 2 wenig länger als breit, die letzten 3 kugelig. Halsschild so lang wie breit, kugelig, äusserst fein chagriniert und ausserdem ziemlich dicht punktiert, beiderseits am Vorderrande, hinter den Augen, mit einer queren, über den Vorderhüften mit einer grösseren und in der Mitte innerhalb des Seitenrandes mit einer kleineren runden, goldig beschuppten Makel. Flügeldecken wenig breiter als das Halsschild, mit 11 tiefen regelmässigen Punktreihen, nur die 3., 4. and 5. Reihe im Spitzenteil verworren, zwischen dem 2. und 4. Punktstreifen und die beiden Spatien ganz ausfüllend, mit 4 von einander ungefähr gleich weit entfernten, goldigen Schuppenpunkten, ein ähnlicher Punkt liegt zwischen dem 7. und 9. Spatium vor der Deckenmitte und einer an der Spitze des 5. und 6. Spatiums (bei einem der beiden Exemplare kaum angedeutet) und je einer an der Wurzel und im 2. Drittel der Decken, zwischen dem 9. und 11. Punktstreifen, so dass im ganzen 3 Querreihen, eine basale und eine antemediane mit je 4, eine subapicale mit 4–6, und eine apicale mit 2 Punktmakeln gebildet werden. Körperunterseite fast ganz unbeschuppt, nur die Seiten der Hinterbrust und zuweilen auch das erste Bauchsternit mit goldigen Schüppchen, im übrigen nur undeutlich punktiert und mit feinen zerstreuten greisen Härchen besetzt, Analsternit zerstreut und ziemlich kräftig punktiert, beiderseits innerhalb des Seitenrandes mit Furche (♂). Beine mit fein und zerstreut schwärzlich behaarten Schienen und an der Wurzel fein querrunzeligen Schenkeln, von denen die hinteren die Deckenspitze stark überragen.

Metapocyrtus (Sphenomorphoidea) transversarius sp. nov. Plate 3, fig. 9, ♀ (lateral view).

Glossy black, with pale green or greenish golden scale markings, consisting of a narrow transverse band on prothorax and three narrow, more or less interrupted bands on elytra. The markings similar to those of *M. picticollis* Heller, body form very similar to that of *M. aureomaculatus* sp. nov. Rostrum as in the latter species, dorsally the punctures coarser, the medial groove more strongly pronounced in the male. Front and sides of head, below eye, with a few scattered scales. Prothorax irregularly scatteredly punctured, discally coarser, in the female discally irregularly confluently and subrugosely punctured. A narrow scale band at anterior margin and a transverse band behind middle, discally mostly interrupted but more or less confluent with an elongate scale patch at each lateral margin, also some scattered scales along posterior margin. Elytra subovate, rather coarsely and irregularly striate-punctate, the punctures closely interspaced, in the males the rows more regular. A narrow transverse band near base, another band before middle, and a third band at apical third; furthermore, a longitudinal elongate spot between second and third puncture rows extending from or from near the last-mentioned transverse band to apex where it becomes confluent with an irregular marginal stripe, which extends to second or antemedial band. The three transverse bands that are interrupted at suture consist of a series of small and irregular scale spots. Female at apical decline with a subsutural row of a few, rather long, pale hairs, remotely apart. Underside sparsely and scatteredly beset with fine hair; metasternum and first abdominal sternite with a scale spot laterally. Hind femora in the female extending slightly beyond apex of elytra, in the male far beyond. Penis structure, Plate 12, fig. 23.

Male, length, 7.8 to 9.2 millimeters (without rostrum) ; width, 3.3 to 4. Female, length, 8 to 11.8 millimeters (without rostrum) ; width, 3.6 to 5.2.

SIARGAO and BUCAS GRANDE, near Mindanao (*Schultze*).

Metapocyrtus (Sphenomorphoidea) transversarius var. **dubiosus** var. nov.

Sculptural characters and markings the same as in the species, except the scale markings on the elytra, which differ as follows: Elytra with two transverse bands only; the subbasal as in the above typical form, and a medial transverse band.

SIARGAO and BUCAS GRANDE (*Schultze*).

The species is very variable in size, and seems to be confined to the localities mentioned.

Metapocyrtus (Sphenomorphoidea) aureomaculatus sp. nov. Plate 3, fig. 6, ♂, fig. 7, ♀ (lateral view) ; Plate 12, fig. 41, ♂, fig. 42, ♀ (head).

Glossy black, with pale greenish golden metallic scale spots. Rostrum longer than broad, dorsally convex, scatteredly punctured with a well-pronounced medial groove in basal half. Basal transverse groove deep, not interrupting the dorsolateral edges. Front sparsely scatteredly punctured, with a sharply defined medial groove and some scattered scales. Prothorax as long as broad, finely and scatteredly punctured, with a sharply defined anterior and posterior submarginal groove, a narrow scale band at anterior margin more or less confluent with an irregular scale patch at each lateral margin, and toward each side dorsolaterally in basal half a large scale spot. Elytra subovate, irregularly striate-punctate, with three transverse rows of pale greenish golden scale spots, and other markings as follows: Each elytron with a basal and an antemedial row of two spots; at apical third an irregular transverse band more or less confluent with a large irregular oblong marginal spot; subapically between second and fourth puncture rows an irregular elongate spot which in some specimens is more or less confluent dorsolaterally with the former band and has a tendency also to connect with the lateral marginal spot at apical third. Metasternum and first abdominal sternite with a scale spot laterally, the underside otherwise beset very sparsely with fine hair. Legs glossy black, tibiæ below with fine black setæ. Hind femora in the female extending to apex of elytra, in the male far beyond. Penis structure, Plate 12, fig. 24.

Male, length, 8 to 10.6 millimeters (without rostrum); width, 3.7 to 4.7. Female, length, 10 to 10.8 millimeters (without rostrum); width, 4.8 to 5.1.

MINDANAO, Surigao Province, Surigao (*Schultze*).

Metapocyrtus (Sphenomorphoidea) mimicus Heller.

Metapocyrtus (*Sphenomorphoidea*) *mimicus* HELLER, Philip. Journ. Sci. § D 7 (1912) 344.

Since I know this species only from the original description, I prefer to give this here.

Violaceo-purpureus, elytris Pachyrrhyncho nobili Hell., similiter lineis albido-squamosis decoratis; rostro latitudine sesqui longiore, haud squamoso, parce punctulato, dorso in dimidia parte basali sulco mediano profundo, in fronte continuato; antennis nigris, funiculi articulis 3°–7° latitudine longioribus; prothorace longitudine latitudine aequali, globoso, levi, margine antico posticoque sulphureo-squamosis; elytris elyptico-globosis, subtiliter subseriatim-punctatis, spatio secundo pone basin lineola brevi, linea marginali apice per spatium secundum antrorsum curvata et post elytrorum dimidium abbreviata, altera transversa, ad suturam interrupta, in elytrorum dimidia parte maculaque minuta longe ante spatii sexti apicem, sulphureo-squamosis; femoribus clavatis, posticis elytrorum apice paulo superantibus.

Long. 10.5, lat. 5 mm.

Patria: Insulae Philippinae, legit *Dr. C. Semper*, unicum M. St.

Die Art ähnelt zufolge der Gestalt, Farbe und Verlauf der hellen Schuppenlinien so sehr an *Pachyrrhynchus nobilis* Hell. dass sie schon von Behrens als *P. imitator* in litt. bezeichnet wurde. Der an der Spitze nicht plötzlich querwulstartig verdickte Rüssel, der an der Wurzel durch eine wenn auch relativ feine, Querfurche abgegrenzt ist, sowie der lange geschwungene Fühlerschaft weisen aber darauf hin, dass kein *Pachyrrhynchus*, sondern eine mehr mit *Apocyrtus* verwandte Gattung vorliege. Rüssel 1½ mal so lang wie breit, fein zerstreut punktiert, in der Basalhälfte mit tiefer Mittelfurche. Fühler schwarz, der geschwungene Schaft den Augenhinterrand erreichend, 1. und 2. Geisselglied verlängert, ungefähr gleich lang, das 2. so lang wie die 3 folgenden zusammen, das 3. länger als das elliptische 4., das letzte (6.) ziemlich kugelig. Halsschild so lang wie breit, kugelig gewölbt, unpunktiert, am Vorderrand etwas breiter als am Hinterrand, beide Ränder gelblich weiss beschuppt. Flügeldecken fein und nur teilweise gereiht-punktiert, ein Längsstrich auf dem 2. Spatium hinter der Wurzel, ein Seitenrandstreifen, der sich auf dem hinteren Drittel des 2. Spatiums wieder nach vorn umbiegt, eine durch die Naht unterbrochene Querlinie, die fast bis zum vorletzten Punktstreifen nach aussen reicht und endlich eine kleine längliche Makel weit vor der Spitze des 6. Spatiums, sowie die Seiten der Hinterbrust, schwefelgelb beschuppt. Unterseite glatt, die Ränder der Bauchschienen fein schräg strigiliert, Schenkel keulenförmig, die hinteren die Deckenspitze etwas überragend.

Subgenus **Sclerocyrtus** Heller

Sclerocyrtus HELLER, Philip. Journ. Sci. § D 7 (1912) 302, 345.

Rostrum relatively short, slightly longer than broad, the sides set off at right angles from dorsal surface, the latter longitudinally more or less strongly arched and separated from front by a very prominent transverse groove. Prothorax subcylindrical, slightly more narrowly truncate apically than basally, coarsely and irregularly granulate or subrugose. Anterior margin ventrally with or without emargination. Elytra short and stout subovate, relatively coarsely subgranulate in longitudinal rows.

Typical species of this subgenus, *M. asper* Heller, from Mindanao.

Heller's definition of this subgenus had to be amplified since one of the principal characters, the anterior ventral emarginate prothorax, is variable, more or less pronounced, or wanting, even in *M. asper.* The two other species which I include in this subgenus are closely related to *M. asper.*

Metapocyrtus (Sclerocyrtus) asper Heller. Plate 6, fig. 27, ♂, fig. 28, ♀ (lateral view); Plate 12, fig. 35, ♂, fig. 36, ♀ (head).

Metapocyrtus (Sclerocyrtus) asper HELLER, Philip. Journ. Sci. § D 7 (1912) 345.

Black, with scattered dots of pale yellowish or creamy scales, the individual scales relatively very small. Rostrum hardly longer than broad, divergent toward apex, dorsally strongly bulgingly convex, at base nearly rectangularly set off from front, sparsely scatteredly punctured, with a deep medial groove, the latter usually terminating before the basal transverse groove. Front with a few punctures and scales and a sharply pronounced medial groove. Sides of head depressed and beset with a spot consisting of pale yellowish hairlike scales. Prothorax subcylindrical, slightly longer than broad, the sides very slightly rounded, in basal half nearly straight, the anterior submarginal groove almost obsolete; anterior margin ventrally more or less abruptly emarginate. Surface of prothorax very coarsely and irregularly granulate, the granulation very glossy, some yellowish scales irregularly sparsely scattered between the granules. Elytra rather short and stout, greatest width behind the middle, coarsely granulate in regular longitudinal rows, behind each granule a small irregular scale dot composed of from four to eight small yellowish scales; the latter also form longitudinal rows. Underside very sparsely and scatteredly whitish setose, last abdominal sternite in the female transversely rugulose. Legs also finely whitish setose. Penis structure, Plate 12, fig. 14.

Male, length, 9 to 9.5 millimeters (without rostrum); width, 4.7 to 5. Female, length, 8.2 to 10.6 millimeters (without rostrum); width, 4 to 5.9.

MINDANAO, Surigao Province, Surigao (*J. F. Pascasio*). SIARGAO (*Schultze; Boettcher*).

Metapocyrtus (Sclerocyrtus) celestinoi sp. nov. Plate 11, fig. 20, ♂ (lateral view).

Black, with pale greenish scales which form numerous small irregular spots, as well as two ill-defined transverse bands on prothorax and two on elytra. Rostrum dorsally in the basal half divergent toward middle, apical half more abruptly convergent toward apex, with scattered punctures which are finer toward apex, and an abbreviated deep groovelike medial depression. Basal transverse groove deep, front sparsely punctured with a deep medial groove and a large irregular scale spot. Sides of head with a large crescent-shaped scale spot. Prothorax subparallel, the truncation at apex slightly narrower than at base, coarsely and irregularly rugose, between the glossy rugosities with small irregular scale dots, along anterior margin and slightly behind middle an irregular transverse band, the latter slightly depressed. Elytra short, subovate, coarsely and irregularly glossy subgranulate, the granulation forming more or less distinct longitudinal rows, and separated by coarse and irregular punctiform depressions from which a minutely fine whitish hair arises. Numerous small scale spots, consisting of from one to seven scales, rather uniformly scattered over elytra between the granules, having also a tendency to form longitudinal rows. At base and basal third a narrow irregular transverse band. Underside sparsely scattered with short whitish hair; prosternum, mesosternum, metasternum, and first and second abdominal sternites with scattered scales. Legs black, sparsely beset with short whitish setæ, femora in apical half above and below and tibiæ in the basal half above with some scattered scales.

Male, length, 8.9 to 10.3 millimeters (without rostrum); width, 4 to 4.7.

SAMAR, Wright, Loquilocon (*McGregor*).

Only male specimens of this remarkable species were received, on account of its mimicry resemblance to another *Metapocyrtus* species, belonging to another section of the genus. I name this species for Mr. McGregor's long-time assistant Andres Celestino, who was also a former collector for John Whitehead.

Metapocyrtus (Sclerocyrtus) chamissoi sp. nov. Plate 11, fig. 27, ♂, fig. 28, ♀ (lateral view); Plate 12, fig. 37.

Black, with pale bluish white scale markings forming two transverse bands on prothorax and two on basal half of elytra, besides longitudinal stripes on apical half of latter. In general form very similar to *M. celestinoi* sp. nov. Rostrum also similar in form and sculpture to the latter; in the female the basal half of dorsal surface rather strongly divergent toward middle, forming there an obtuse angle, apical half toward apex abruptly convergent. Basal transverse groove deep, not interrupting the dorsolateral edge. Front with a sharply defined medial groove and scattered scales. Sides of head with a crescent-shaped scale spot. Prothorax very coarsely and irregularly rugose, the rugosities coarser and more pronounced than in *M. celestinoi.* A narrow scale band at anterior margin, another transverse band slightly behind middle, the latter more distinctly depressed than in *M. celestinoi,* and some more or less densely scattered scales along posterior margin. Elytra with very coarse punctiform depressions in irregular longitudinal rows, the interspaces forming irregular coarse and glossy rugosities which are pronouncedly subgranulate toward lateral margin. Subbasally a narrow transverse scale band and another at basal third, both bands confluent with a lateral marginal stripe, the latter extending to near apex where it becomes confluent with a longitudinal stripe, at the third interstice reaching forward to about middle. Each elytron, besides the above markings, with three other abbreviated longitudinal stripes in apical half and a fine interrupted sutural scale stripe extending from second transverse band to apex. Underside sparsely and scatteredly beset with whitish hair, mesosternum and metasternum with a scale patch laterally, first abdominal sternite with an indistinct transverse scale band, second with some scattered scales. Legs black, moderately whitish setose, femora usually with a few scattered scales apically below.

Male, length, 8.8 to 9.7 millimeters (without rostrum); width, 3.9 to 4.3. Female, length, 9.8 to 11 millimeters (without rostrum); width, 4.7 to 5.1.

SAMAR, Wright, Loquilocon (*McGregor*).

This species is easy to distinguish on account of its very characteristic markings.

Subgenus **Orthocyrtus** Heller

Orthocyrtus HELLER, Philip. Journ. Sci. § D 7 (1912) 302, 347.

Large species, with a few exceptions. Rostrum of medium length, dorsally straight, mostly in a plane with front, exceptionally slightly concave; at base the sides rectangularly declined. Female elytra, with a few exceptions, without any secondary sexual structural characters aside from stouter form, similar to the male elytra.

Typical species of this subgenus, *M. triangularis* Heller, from Dalupiri Island of the Babuyan group, north of Luzon.

This subgenus contains some of the most striking species on account of their unusually strong mimicry resemblance to certain species of the genus *Pachyrrhynchus* Germar.

Metapocyrtus (Orthocyrtus) triangularis Heller. Plate 6, fig. 11, ♀ (lateral view); Plate 12, fig. 50, ♀ (head).

Metapocyrtus (*Orthocyrtus*) *triangularis* HELLER, Philip. Journ. Sci. § D 7 (1912) 348; KUNTZEN, Deutsche Ent. Zeitschr. (1914) 452.

Black, moderately glossy, head and prothorax with scattered scales, elytra with golden greenish scale markings. Rostrum finely punctured in apical half, but coarsely in basal half, latter with a deep medial groove and a deep transverse groove at base.

Front scatteredly punctured, with the medial groove extending to vertex. Head, below eyes with a scale spot, behind eyes with some fine transverse wrinkles. Prothorax broader than long, the sides evenly rounded, very irregularly, rather shallowly but coarsely punctured, lateral margins with an irregular scale patch. Elytra short ovate, apical decline steep, so that apex appears retracted; uniformly and moderately densely striate-punctate, a minutely fine brownish golden hair arising from each puncture. The variable greenish scale markings are represented by a transverse basal band interrupted at suture and a lateral marginal stripe terminating before apex as well as three transverse rows of elongate scale spots. Each elytron, in the first transverse row, before the middle, with two spots; second row behind the middle with two or three spots, and the third row represented by one spot near apex. Sometimes the scale markings of elytra are absent or only rudimentarily represented. Underside sparsely and finely pale greenish white setose. Femora sometimes reddish, anterior tibiæ on underside with fine tubercles, less distinct on the others.

Female, length, 13 to 14.3 millimeters (without rostrum); width, 6.2 to 7.7.

DALUPIRI, Babuyan group, August 20, 1909 (*McGregor*).

Heller gives only "Philippines" as the locality for this species. The locality given by me is taken from the Bureau of Science accession record No. 11560, quoted by Heller.

Another specimen, a female, was forwarded to me by the British Museum, without exact locality.

This species is easily recognized by its peculiar form, the elytra being relatively very broad and the apical decline very abrupt. Another important character is the fine hair arising from each puncture of the elytra, which is not mentioned in Heller's original description.

Metapocyrtus (Orthocyrtus) pretiosus Schultze. Plate 11, fig. 11, ♂, fig. 12, ♀ (lateral view).

Homalocyrtus pretiosus SCHULTZE, Philip. Journ. Sci. § D 13 (1918) 375, pl. 1, fig. 9, ♂.

Dark brown to black, with metallic golden green scale markings. Related to *M. triangularis* Heller. Rostrum divergent toward apex, apically finely scatteredly punctured, toward base the punctures denser and coarser, with a strongly pronounced medial groovelike depression beset with an elongate irregular scale spot which crosses the well-defined basal transverse groove and is continued on front, more sharply defined. Front sparsely scatteredly punctured. Sides of head below eye with a small scale spot. Prothorax broader than long; dorsally slightly flattish, the sides gently rounded; coarsely and irregularly punctured, dorsolaterally the punctures more or less confluent. Discally a more or less abbreviated medial scale stripe located in an indistinct groovelike depression, dorsolaterally in basal half an oblong scale spot, lateral margins above anterior coxæ with a large scale patch which is confluent with a narrow irregular anterior marginal band, the latter dorsally interrupted. Elytra stout subovate; in the male the apical sutural decline uniformly rounded, in the female with a distinct sutural humplike swelling; female elytra at apex obtusely emarginate, elytra in both sexes coarsely and irregularly striate-punctate. The distinctly impressed metallic golden green scale markings consist of very irregular spots or patches which in some specimens have a tendency to form irregular and more or less interrupted longitudinal stripes and, at the interruptions, bare transverse bands. These bare transverse bands, before and behind the middle, are more pronounced in the females. Underside sparsely whitish setose, male more densely setose in the middle of the mesosternum, metasternum, and first abdominal sternite. Legs reddish brown, blackish at apex of femora and tibiæ, also moderately setose. Penis structure, Plate 12, fig. 22.

Male, length, 12.3 to 16.5 millimeters (without rostrum); width, 5.8 to 8.5. Female, length, 12.2 to 14.5 millimeters (without rostrum); width, 6.2 to 7.

LUZON, Ilocos Norte Province, Mount Palimlim (*Schultze*).

This species I described originally as belonging to *Homalocyrtus* Heller, and it has a superficial resemblance to certain species of that genus; but it is most closely related to *M. triangularis* Heller which fact is substantiated by the form of the penis structure. Unfortunately, in the original description I confounded the sexes of this species, correction of which error is made in the description here given.

Metapocyrtus (Orthocyrtus) ilocanus sp. nov. Plate 2, fig. 20, ♀ (lateral view).

Dark reddish brown to almost black, prothorax and elytra with sparsely scattered blue scales, forming small irregular spots. Related to *M. pretiosus* Schultze, very similar in general form to that species but smaller. Rostrum dorsally irregularly punctured with a strongly pronounced elongate medial depression in basal half, the dorsolateral area slightly swollen. Basal transverse groove deep; front scatteredly punctured with a strongly pronounced medial groove and along the latter with a few scales. Prothorax broader than long, sides uniformly rounded; truncation at apex only slightly narrower than at base, irregularly confluently and slightly subrugosely punctured with a small, irregular blue scale spot at lateral margin. Elytra short and stout subovate, irregularly striate-punctate, in the female at the beginning of apical sutural decline with an indistinct humplike swelling which is less pronounced than in *M. pretiosus*. Apical decline very steep, elytra at apex with an obtuse angular gap. Some small and irregular fragmentary blue scale markings are usually present at base and along lateral margin. Mesosternum and metasternum laterally with a small patch of blue scales. Femora and tibiæ reddish brown, apically black. Underside and legs very finely and sparsely whitish setose.

Female, length, 10 to 11.2 millimeters (without rostrum); width, 5 to 5.7.

LUZON, Ilocos Norte Province, Burgos (*Schultze*).

This species has a very strong superficial resemblance to species of the genus *Homalocyrtus*.

Metapocyrtus (Orthocyrtus) bifoveatus sp. nov. Plate 1, fig. 11, ♂; Plate 6, fig. 3, ♂, fig. 4, ♀ (lateral view); Plate 12, fig. 49.

Glossy black, legs dark brown, prothorax and elytra with very small and scattered pale bluish scales and larger metallic greenish scales along lateral margins. Rostrum one and one-half times as long as broad, dorsally in a plane with front, finely but densely and confusedly punctured, more coarsely toward base. A groovelike medial depression and some scattered greenish scales in basal half, the former continued as a distinct medial groove on front, transverse basal groove indistinct. Prothorax as long as broad, the sides slightly rounded, glossy and glabrous, with a large dimplelike depression toward each side dorsolaterally, located slightly behind the middle between anterior and posterior margins, the fovea beset with some fine scattered greenish scales. Lateral margins of prothorax with an irregular patch of larger metallic green scales. Elytra short-ovate, dorsally flattish, the apical decline steep, finely and uniformly punctate, with three broad but very indistinct transverse bands consisting of very small and scattered pale bluish gray scales at base, in the middle, and at apical third. Toward lateral margin the scales denser and at lateral margin confluent with an irregular marginal stripe consisting of larger metallic greenish golden scales. Prosternum and mesosternum entirely, metasternum and first abdominal sternite in the middle only, densely beset with short golden brownish pubescence.

Male, length, 12 millimeters (without rostrum); width, 5.8. Female, length, 12.7 millimeters (without rostrum); width, 6.3.

NEGROS, Occidental Negros, Fabrica (*Schultze*).

In general form this species comes closest to *M. triangularis* Heller, but it is dorsally more flattish than that species.

This species is remarkable and easily recognized on account of the peculiar scale markings, but especially by the very unusual fovea on the prothorax. The last-mentioned character is extremely rare in the pachyrrhynchid group, but similar prothoracical dimplelike depressions are present in *Eumacrocyrtus canlaonensis* Schultze, also from Negros.

Metapocyrtus (Orthocyrtus) politus Heller. Plate 7, fig. 6, ♂, fig. 7, ♀ (lateral view).

Metapocyrtus (*Orthocyrtus*) *politus* HELLER, Philip. Journ. Sci. § D 7 (1912) 349; KUNTZEN, Deutsche Ent. Zeitschr. (1914) 452.

Glossy black, with a few scattered bluish or whitish scales at lateral margins of prothorax and elytra. In general form somewhat similar to *M. triangularis* Heller, but smaller. Rostrum slightly divergent toward apex, irregularly coarsely punctured, basal half with an elongate groovelike medial depression confluent with the deep transverse basal groove. Front finely scatteredly punctured, with a sharply defined medial groove. Prothorax slightly broader than long, with an anterior and a posterior submarginal groove, finely and rather distantly scatteredly punctured with some irregularly scattered scales at lateral margins above anterior coxæ. Elytra short subovate; in both sexes the apical sutural decline uniformly sloping, rounded at apex, irregularly distantly striate-punctate, a very fine hair arising from the punctures along lateral margins. A small patch of a few scattered scales is mostly present basally at the humeral angle and in the middle at lateral margin. Underside and legs beset with scattered porrect whitish hair. Mesosternum and metasternum laterally with a patch of whitish hairlike scales.

Male, length, 11.4 to 12.5 millimeters (without rostrum); width, 5 to 5.8. Female, length, 11.5 millimeters (without rostrum); width, 5.4.

LUZON, Benguet Subprovince, Mount Pauadan, 2,300 meters (*Schultze*).

The last sentence in Heller's original description is evidently a misprint, since the hind femora in the female scarcely reach the apex of the elytra but in the male reach well beyond; he states exactly the reverse.

Metapocyrtus (Orthocyrtus) propolitus Schultze. Plate 4, fig. 28, ♂, fig. 29, ♀ (lateral view).

Metapocyrtus propolitus SCHULTZE, Philip. Journ. Sci. 23 (1923) 600, pl. 1, fig. 5, ♀.

Glossy dark brownish black, with a few scattered pale blue or whitish scales at sides of prothorax and elytra. Nearly related to *M. politus* Heller. Rostrum with a broad and strongly pronounced longitudinal groove confluent with a sharply defined transverse groove at base, densely but irregularly punctured, the punctures small toward apex but very coarse toward base; front scatteredly punctured, the longitudinal groove sharply defined, continued, almost reaching vertex. Sides of rostrum with a groovelike depression before eyes, reaching to antennal scrobe. Prothorax broader than long, the greatest width slightly before the middle, rather uniformly scatteredly punctured. A sharply defined anterior submarginal groove and a posterior submarginal groove. Lateral margins with a few pale blue or whitish scattered scales. Elytra short-ovate, with irregular puncture rows, the punctures coarser than in *M. politus*. In the male the elytra regularly sloping toward apex, at the latter uniformly rounded as in that species, but in the female the apex of elytra forms a large and prominent triangular projection, the latter formed by two apical thornlike terminations of the elytra which are firmly united but still show a distinct broad groovelike depression dorsally. Anterior margin of elytra in both sexes slightly raised or swollen, at lateral basal angle a few scattered scales and in the middle along margin another scattered swarm of scales. Near apex some very fine, scattered silky white hair arising from the punctures. Sides of rostrum and head and legs also beset with scattered silky white hair. Mesosternum and metasternum laterally with a cluster of white scales.

Male, length, 12 millimeters (without rostrum); width, 5.5. Female, length, 13.5 millimeters (without rostrum); width, 6.

LUZON, Kalinga Subprovince, Lubuagan (*my collector*); Davangan (*A. Herre*).

Metapocyrtus (Orthocyrtus) caeruleonotatus Waterhouse. Plate 3, fig. 5, ♂ (lateral view).

Apocyrtus caeruleonotatus WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 303.
Metapocyrtus (*Orthocyrtus*) *caeruleonotatus* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 348.

Glossy black, with roundish, moderately sized blue scale spots. Rostrum longer than broad, divergent toward apex, dorsally flat, densely and confluently punctured with a very indistinct shallow depression and a medial groove, as well as an irregular elongate scale spot in basal half. Basal transverse groove well pronounced, front sparsely punctured and finely rugose with a more or less distinctly defined medial groove. Sides of head with a scale spot below eye. Prothorax subglobular, slightly broader than long, rather densely and irregularly punctured. A narrow scale band at anterior margin, mostly discontinued laterally; lateral margins with an irregular scale patch; dorsolaterally in the middle a roundish blue scale spot. Elytra subovate, irregularly striate-punctate. Each elytron usually with sixteen but in some specimens up to twenty-four spots, located as follows: Two near base; two forming a transverse row in the middle; three more or less irregularly transversely arranged at apical third, the upper or dorsolateral one sometimes bifid; and one other spot near apex. Underside, mesosternum, and metasternum laterally with a blue scale patch, in the middle rather densely beset with pale brownish hair.

Male, length, 11 to 14.5 millimeters (without rostrum); width, 5.2 to 6.3.

MINDANAO, Surigao Province, Taganito. DINAGAT (*Schultze*).

The seven specimens from Mindanao and the one from Dinagat are all males. The Dinagat specimen has the prothorax coarsely confluently and subrugosely punctured. All the specimens were compared with a cotype specimen, a male, loaned by the British Museum.

Metapocyrtus (Orthocyrtus?) hopei Waterhouse.

Apocyrtus hopei WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 303.
Metapocyrtus (*Orthocyrtus*) *hopei* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 348.

Since this species is unknown to me I prefer to give the original description, as follows:

Apocyrtus Hopei.

Ap. niger; capite anteriore et rostro rugosis, lineâ squamosâ longitudinali; thorace subgloboso, distinctè punctato, punctis plerùmque confluentibus, marginibus anticis et lateralibus, sic et maculis duabus suprà squamis obsitis; elytris ovatis, thorace conspicuè latioribus, irregularitèr punctato-striatis, striis ordine gemino dispositis; ad basin et ad apicem lineis duabus longitudinalibus, fasciâ in medio, margine laterali, maculisque duabus subapicalibus è squamis effectis; maculis notisque omnibus pallidè cupreis. Long. corp. 6¼ lin.; lat. 2½ lin.

This species is about equal in size to the *Pachyrhynchus moniliferus*, and approaches that insect in form; but the rostrum is rather narrower and longer, and the elytra are also more elongated. The markings are of a very pale copper colour, with a slight metallic hue; they consist of a longitudinal mark between the eyes which extends on to the rostrum, terminating in a line with the point of insertion of the antennæ; a line borders the anterior margin of the thorax, and there is a patch of scales on the sides of the thorax just above the base of the femora; besides these two marks, are two spots on the upper surface: a moderately broad line runs parallel with and close to the outer margin of each elytron, but is interrupted towards and at the apical portion; at the base is a longitudinal mark situated at a short distance from the suture; this mark is joined to the lateral band by a transverse line at the base of the elytra; it terminates considerably short of a central transverse fascia: on the apical portion of the elytra are two other longitudinal marks, the foremost portion of which is thickened, and lastly there are two largish transverse subapical spots. Besides the scales which form these spots and markings, are numerous minute scattered hairs on the hinder part of the elytra, as well as on the body beneath and on the legs.

Philippines; exact locality unknown.

Metapocyrtus (Orthocyrtus) schoenherri Waterhouse. Plate 4, fig. 2, ♀ (lateral view).

Apocyrtus schoenherri WATERHOUSE, Ann. & Mag. Nat. Hist. **9** (1842) 302.

Metapocyrtus (Orthocyrtus) schönherri Waterhouse, HELLER, Philip. Journ. Sci. § D **7** (1912) 348; SCHULTZE, Philip. Journ. Sci. **23** (1923) 605.

Metapocyrtus (Orthocyrtus) malayanus SCHULTZE, Philip. Journ. Sci. **15** (1919) 552, pl. 1, fig. 2, ♀.

Glossy black, prothorax and elytra with pale greenish and reddish golden metallic spots. Rostrum rather densely and confluently punctured, a broad and shallow medial depression in basal half, beset with an oblong scale spot and a fine medial groove which is continued in the front, the latter sparsely and scatteredly punctured. Sides of head below eye with a small spot. Prothorax as long as broad, subglobose, very coarsely and irregularly confluently punctured, some specimens with a nearly obsolete, faintly indicated medial groove. At anterior and posterior margin laterad a short scale line; lateral margins with a large oblong scale patch; in the middle dorsolaterally a roundish scale spot of about the size of an eye. Elytra ovate, rather strongly convex, irregularly striate-punctate. Each elytron with two rather regular transverse rows of spots and an irregular transverse row at apical third besides several other spots as follows: Two spots at base of each elytron, one dorsally, the other laterally; three spots form a transverse row at middle; at lateral margin a large oblong spot, rather behind the middle; at apical third an irregular transverse series of three spots, one at lateral margin, the second small, above the latter, and a large dorsolateral spot near suture, which has a tendency to become bifid. At apex still another, large, more or less triangular spot. Mesosternum and metasternum with a scale spot laterally. Femora with some scattered scales near apex.

Male, length, 13.8 to 14.5 millimeters (without rostrum); width, 5.5 to 6. Female, length, 14.8 to 15.5 millimeters (without rostrum); width, 6.5 to 7.

MINDANAO, Surigao Province, Surigao and Taganito. DINAGAT (*A. Duyag*).

Recently I received a Cuming specimen of this species from the British Museum which Mr. Arrow kindly compared with the type. Comparison proves conclusively that this species is identical with *M. malayanus* Schultze. *Metapocyrtus schoenherri* Waterhouse is also somewhat variable as to the number of spots on the elytra; some specimens have only two spots in the middle transverse row, others as many as four. This species is recognizable by the peculiar, pale reddish golden and somewhat opalescent spots. Specimens from Dinagat Island have the punctures on prothorax more strongly confluent; the spots are mostly reduced in size.

Metapocyrtus (Orthocyrtus) schoenherri subsp. **atratus** Schultze.

Metapocyrtus (Orthocyrtus) malayanus atratus SCHULTZE, Philip. Journ. Sci. 15 (1919) 553.

Entirely glossy black; punctures on rostrum, prothorax, and elytra sparser and less pronounced.

BUCAS GRANDE.

This subspecies represents a parallel to *Pachyrrhynchus venustus insulanus* Schultze, also entirely black, together with which it was collected from the same plants.

Metapocyrtus (Orthocyrtus) consobrinus Schultze. Plate 6, fig. 5, ♂, fig. 6, ♀ (lateral view).

Metapocyrtus (*Orthocyrtus*) *consobrinus* SCHULTZE, Philip. Journ. Sci. 15 (1919) 554, pl. 1, fig. 5, ♀.

Black, with pale green scale markings. Rostrum densely and confluently punctured, basal half with a broad but shallow depression beset with a small irregular scale spot, the depression extending in the male to the front. The latter irregularly and scatteredly punctured, mostly with an indistinct medial groove. Prothorax broader than long, greatest width before the middle, very strongly and coarsely coriaceous, females mostly with a fine and indistinct rudimentary medial groove; dorsolaterally behind the middle an ill-defined scale spot; at anterior and posterior submarginal groove laterally a transverse patch of scales, and at each lateral margin a large irregular scale patch. Elytra irregularly striate-punctate, the punctures much coarser and denser than in *M. schoenherri* Waterhouse. Each elytron with the following scale markings: Three oblong spots at base, the dorsal one having the appearance of a rudimentary longitudinal stripe; a transverse row of ill-defined spots in the middle having a tendency to form a band; an oblong spot at lateral margin; at apical third three or four ill-defined elongate dashes, one of which dorsolaterally appears as a rudimentary stripe. In the female the apical sutural decline slightly swollen, beset with a few fine setæ, the apical termination of elytra obtusely projecting, also beset with some scattered setæ. Underside and legs sparsely whitish setose. Penis structure, Plate 12, fig. 2.

Male, length, 12 to 13.3 millimeters (without rostrum); width, 5.5 to 5.7. Female, length, 11.5 to 14.8 millimeters (without rostrum); width, 5.5 to 6.8.

MINDANAO, Surigao Province, Taganito. DINAGAT (*Duyag*).

A female specimen from Dinagat has the dorsolateral spots of prothorax more oblique. This species is very variable as to scale markings. Some specimens are entirely black, particularly males; only a few of the latter show faint traces of the markings. *Metapocyrtus consobrinus* is easily distinguished from *M. schoenherri* Waterhouse and other related species by the ill-defined markings and the very coarse sculpture, particularly of the prothorax.

Metapocyrtus (Orthocyrtus) helleri sp. nov. Plate 1, fig. 3, ♀; Plate 4, fig. 1, ♀ (lateral view).

Glossy black, with pale green scale markings. Related to *M. schoenherri* Waterhouse. Rostrum scatteredly punctured, near base with a very indistinct longitudinal depression beset with scales, basal transverse groove strongly pronounced. Front sparsely scatteredly punctured, with a fine medial groove. Sides of head below eye with an oblong scale spot. Prothorax broader than long, the anterior submarginal groove dorsally farther from margin than in *M. schoenherri,* laterally more convergent, not parallel with margin, coarsely and scatteredly punctured, at apical half a very fine medial groove. Along anterior margin a narrow scale band confluent with a large elongate scale patch at each lateral margin. Dorsolaterally a large oblong spot extending from about the middle to near the basal submarginal groove. Elytra very similar to *M. schoenherri* in form and approximate position of the spots, irregularly and rather coarsely striate-punctate, the spots much larger than in the latter species. Each elytron with two large oblong oval spots at base; four spots forming a transverse row at the middle, the lateral marginal one much elongated and extending backward; between these four spots sometimes secondary small roundish spots; at apical third three other spots, the one near suture very large, the other two placed more laterally and slightly more posteriorly; near apex a large oblong spot. Mesosternum, metasternum, and first and second abdominal sternites laterally with a scale spot. Femora with a large patch of scales near apex.

Female, length, 15.5 millimeters (without rostrum); width, 7.2.

LUZON, Camarines Norte Province, Paracale (*Schultze*).

This species is readily distinguished from *M. schoenherri* by the less confluent punctures on prothorax. The dorsolateral spots in *M. helleri* are large and oblong, in *M. schoenherri* small and roundish. In the latter species the spots are much differently colored and much smaller, particularly on the elytra. I take pleasure in naming this interesting species in honor of the curculionid specialist Dr. K. M. Heller, Dresden.

Metapocyrtus (Orthocyrtus) boholensis sp. nov. Plate 1, fig. 2, ♀; Plate 6, fig. 18, ♂, fig. 19, ♀ (lateral view).

Glossy black, prothorax and elytra with pale green scale spots. Related to *M. schoenherri* Waterhouse. Rostrum very similar to that of the latter but much finer and more sparsely punctured, basal half with a shallow medial depression beset with an irregular spot and a more or less distinct groove, usually more strongly pronounced in the male. Front very sparsely punctured, without any medial groove. Sides of head below eye with a small scale spot. Prothorax as long as broad, finely and distantly scatteredly punctured, a narrow scale band along anterior margin confluent with a large oblong scale patch at each lateral margin. Dorsolaterally toward each side in the middle a large oblong-oval scale spot. Elytra ovate, irregularly striate-punctate, the punctures finer than in *M. schoenherri.* Each elytron with a rather broad, more or less interrupted marginal stripe, extending from base to apex where it becomes confluent with a short and irregular dorsolateral stripe at apical decline; furthermore, three transverse rows of irregular spots. A basal row with two spots, the dorsal one large and oblong; the middle row with four to seven spots, and the third row at apical third with four to six spots. The male usually has fewer spots. At apical decline in the female an oblong subsutural dash, which in the male is represented by rudimentary spots. Mesosternum, metasternum, and first and second abdominal sternites laterally with a scale spot. Femora with an irregular scale patch near apex.

Male, length, 13 millimeters (without rostrum); width, 5.6. Female, length, 14.3 millimeters (without rostrum); width, 6.8.

BOHOL, Bilar (*Duyag*).

Metapocyrtus (Orthocyrtus) boholensis var. **semotus** var. nov. Plate 6, fig. 20, ♂.

Prothorax with the punctures coarser and more numerous than in *M. boholensis,* particularly in the female. Spots on elytra smaller and fewer; lateral marginal stripe in both sexes interrupted.

LEYTE, Cabalian (*G. Lopez*); Palompon (*Elicaño*). BILIRAN (*McGregor*).

Metapocyrtus schoenherri Waterhouse differs from this variety in having the punctures on prothorax coarser and more irregularly confluent, the dorsolateral spots small and roundish, and all scale markings of a reddish golden hue.

Metapocyrtus (Orthocyrtus) virens Heller. Plate 4, fig. 16, ♀ (lateral view).

Metapocyrtus (*Orthocyrtus*) *virens* HELLER, Philip. Journ. Sci. § D 7 (1912) 350.

Black, prothorax and elytra almost entirely covered by brilliant greenish golden scales. Rostrum about one and one-half times as long as broad, lengthwise slightly convex, in apical half finely and densely punctured, in basal half more coarsely. Latter with a well-pronounced groovelike medial depression, and a deep transverse groove at base. Head below eye with a small scale spot. Front scatteredly punctured, with a fine medial groove and an irregular scale spot. Prothorax slightly broader than long, subglobular, irregularly and rather coarsely punctured and densely beset with greenish golden scales. Elytra elongate-elliptical, in the male as broad as prothorax, in the female usually broader, coarsely and confusedly punctured, the apical sutural decline beset with rows of fine setæ, also the margins near apex. Elytra more or less densely and uniformly beset with greenish golden scales, some specimens with two irregular and ill-defined bare transverse bandlike areas. Underside, mesosternum, and metasternum laterally with some scattered scales. Legs dark reddish brown, finely and scatteredly setose. Hind femora in the female extending slightly, in the male well beyond apex of elytra.

Male, length, 10 millimeters (without rostrum); width, 3.2. Female, length, 9 to 10.8 millimeters (without rostrum); width, 4 to 4.6.

LUZON (*Semper*); exact locality unknown.

This species, as Heller has mentioned, bears a strong superficial resemblance to *M. bituberosus* Heller. The latter species is immediately recognizable by the conical projection on underside of rostrum, which is wanting in the former.

Metapocyrtus (Orthocyrtus) ornatus Schultze. Plate 4, fig. 26, ♂, fig. 27, ♀ (lateral view).

Metapocyrtus (*Orthocyrtus*) *ornatus* SCHULTZE, Philip. Journ. Sci. 15 (1919) 555, pl. 1, fig. 12, ♂.

Black, with pale green scale markings and with scattered metallic golden or purplish scales between the markings on prothorax and elytra. Rostrum strongly coriaceous with a transverse groove at base, basal half with a large squarish shallow depression bearing an irregular spot of reddish golden scales. Front scatteredly punctured, with a fine medial groove and some scattered scales along margins of eyes. Prothorax subglobular, strongly coriaceous, with an anterior and a posterior submarginal groove. At anterior margin a band of reddish golden scales, dorsally a medial groove bearing a scale stripe, dorsolaterally another broader stripe and at lateral margins an irregular scale patch. Between the distinctly defined scale markings are scattered purplish metallic scales. Elytra oval, very coarsely and rather densely punctured in irregular rows. Each elytron with an irregular transverse band at base, which is oblong, expanded spotlike near suture; another transverse band at about the middle interrupted at suture, and posterior of the latter a third irregular transverse band also interrupted at suture. All the bands are more or less confluent with a marginal stripe which extends to apical triangle and becomes confluent with a subsutural stripe, which terminates before reaching posterior transverse band. Posterior band confluent with a short submarginal stripe, and between the latter and the subsutural stripe two irregular spots. Between these distinct markings numerous scattered metallic purplish scales. Underside in both sexes with a patch of greenish and some metallic golden scales on mesosternum, metasternum, and first abdominal sternite laterally. Male with a patch of rather long pale brownish hair in the middle of the abovementioned parts of underside. Scattered reddish metallic scales on femora near apex and on tibiæ above.

Male, length, 12.2 to 14.5 millimeters (without rostrum); width, 5.8 to 6.2. Female, length, 12 to 12.5 millimeters (without rostrum); width, 5.6 to 6.2.

DINAGAT. BUCAS GRANDE (*Schultze*).

This species is most readily distinguished by the longitudinal medial groove and stripe on prothorax.

Metapocyrtus (Orthocyrtus) insulanus Schultze. Plate 4, fig. 25, ♀ (lateral view).

Metapocyrtus (*Orthocyrtus*) *insulanus* SCHULTZE, Philip. Journ. Sci. 15 (1919) 552, pl. 1, fig. 8, ♀.

Glossy black, with pale greenish yellow scale markings. Rostrum densely and confluently punctured with an indistinct shallow depression and a squarish scale spot. Another spot at sides of head below eye. Prothorax slightly broader than long, coarsely scatteredly punctured with a fine anterior and well-pronounced posterior submarginal groove. A narrow anterior and posterior marginal band confluent with a large patch at lateral margins. In the middle dorsolaterally a transverse bandlike spot. Elytra irregularly striate-punctate, the punctures somewhat coarser in the male. Each elytron with the following markings: Two elongate basal spots, one dorsally, the other near lateral margin; between these two spots sometimes one or two small spots; at about the middle a narrow transverse band, more or less interrupted so as to form a cross row of spots; at about apical third another cross row of from four to six spots, two located more dorsolaterally are very much elongate posteriorly. Along the lateral margin, a long stripe reaching to apex where it becomes somewhat expanded and confluent with a short subsutural stripe terminating before the cross row at apical third. Mesosternum and metasternum laterally with a large scale spot. Femora with an irregular scale patch near apex. Hind femora of female not reaching to apex of elytra; of male reaching beyond. Penis structure, Plate 12, fig. 1.

Male, length, 12 to 14 millimeters (without rostrum); width, 5 to 5.8. Female, length, 14 to 15.8 millimeters (without rostrum); width, 5.8 to 6.5.

SIARGAO (*Schultze*).

This species seems to be confined to the above-named locality.

Metapocyrtus (Orthocyrtus) lanusinus Schultze. Plate 4, fig. 23, ♀, fig. 24, ♂ (lateral view).

Metapocyrtus (Orthocyrtus) lanusinus SCHULTZE, Deutsche Ent. Zeitschr. (1922) 43, pl. 1, fig. 8, ♀.

Glossy black, with pale greenish white scale markings; related to *M. insulanus* Schultze, but slenderer. Sculpture of rostrum as in that species, the basal transverse groove straight and much more strongly pronounced, the scale spot much more largely expanded on front. Prothorax longer than broad, finer and more regularly punctured than in *M. insulanus,* with a narrow band at anterior and posterior margin confluent with a scale stripe at lateral margins. In the middle another transverse band irregularly expanded spotlike and discally more or less interrupted. Elytra iregularly striate-punctate, much finer and more distantly apart than in *M. insulanus.* Each elytron with a fine sutural scale line and four longitudinal stripes, three of which are more or less interrupted. Between the last-mentioned primary stripes are rudimentary secondary stripes which in the first and second interstices, particularly in the female, are reduced to smaller spots, or form elongate spots in the third and fourth interstices. In the male all stripes are broader, the secondary are present mostly in the middle of the elytra as roundish or oblong rudimentary spots, forming a kind of transverse row. The marginal stripe continuous from base to apex and at the latter confluent with the first primary stripe. Femora finely but much more strongly whitish setose than in *M. insulanus* Schultze, without any scale markings.

Male, length, 14.5 millimeters (without rostrum); width, 5.5. Female, length, 13.5 to 16.5 millimeters (without rostrum); width, 6 to 6.5.

MINDANAO, Bukidnon Province, Lindaban (*Schultze*).

Metapocyrtus (Orthocyrtus) moorei Schultze. Plate 4, fig. 6, ♂, fig. 7, ♀ (lateral view).

Metapocyrtus moorei SCHULTZE, Philip. Journ. Sci. 23 (1923) 601.

Glossy black; prothorax and elytra with large golden green metallic scale patches. Rostrum densely punctured, the punctures in apical half small, in basal half coarse and irregular. Basal half with a strongly pronounced, somewhat rectangular depression bearing mostly a patch of scales. A distinct dorsal cross groove at base separating rostrum from front, the latter sparsely punctured and with a fine longitudinal median groove. Sides of head with a scale spot below eye. Prothorax slightly broader than long, uniformly scatteredly punctured with an anterior submarginal scale stripe, a large irregular scale patch in the middle toward each side, and an oblong patch at each lateral margin. Elytra ovate, with rather irregular rows of fairly coarse punctures. Each elytron of the male with two large scale spots at base, three others at the middle, of which an oblong marginal spot extends toward apex, and a series of three or four irregular spots at apical third. In the female, and sometimes in the male, the two basal spots confluent, forming a broad crossband, the spots at apical third also confluent, forming a large, more or less triangular patch which extends from first row of punctures laterally to margin. Apex of elytra with a few whitish setæ. Metasternum and first abdominal segment laterally with a large scale spot. In the males the mesosternum and metasternum in the middle with a rather dense patch of fine setæ. In both sexes femora in apical part with a large patch or swarm of scales. Tibiæ and tarsi strongly setaceous.

Male, length, 12 millimeters (without rostrum); width, 5. Female, length, 14 millimeters (without rostrum); width, 6.5.

MINDANAO, Lanao Province, Dansalan, April 21, 1920 (*Dr. A. Moore*).

Metapocyrtus (Orthocyrtus) lenis Chevrolat. Plate 5, fig. 19, ♂ (lateral view).

Apocyrtus lenis CHEVROLAT, Le Natur. 1 (1881) 382.
Metapocyrtus (*Orthocyrtus*) *lenis* Chevrolat, HELLER, Philip. Journ. Sci. § D 7 (1912) 348.

Glossy black, with metallic greenish blue scale markings. Rostrum irregularly confusedly punctured, basal half concavely depressed with an indistinct medial depression, basal transverse groove well pronounced. Front with a fine medial groove. Prothorax broader than long, the greatest width before the middle, finely, indistinctly, and sparsely scatteredly punctured, with a narrow scale band at anterior margin; toward each side dorsolaterally in basal half an oblong spot, not reaching to posterior submarginal groove; lateral margins with a large oblong scale patch. Elytra subovate, irregularly and confusedly striate-punctate, each elytron with two scale spots at base; three others form an irregular transverse row before the middle, of which two are located more laterally and are mostly confluent; behind the middle a large elongate marginal spot; at apical third another irregular transverse row of three spots; and at apical decline between second and fourth puncture rows an elongate stripelike spot. Mesosternum, metasternum, and first abdominal sternite in the male sparsely and scatteredly beset with fine and long silky hair.

Male, length, 11.5 millimeters (without rostrum); width, 5.

Philippines; exact locality unknown.

The original description is given, as follows:

> A. lenis.—Long. rost. exc. 12 mill. Lat. 4½ mill.—Elongatus, niger subnitidus, lenis, minutissime coriaceus; rostro supra plano, antice declivi, transversim bisulcato; clava usque ad apicem clavata; prothorace elongato, antice paululum attenuato et postice cylindrico, sulcato, lateribus anticis rotundato, supra minutissime coriaceo; scutello inconspicuo; elytris ovalibus, apice conjunctim obtuse productis et rotundatis, basi reflexis et extus recte exertis, fascia basale et alia media margine juncta et in singulo maculis quatuor 2–2 ante apicem coeruleis; femoribus clavatis, nitidis, tibiis in margine interno pilosis, posticis longioribus.
>
> Ins. Philipp. typus auct. ex mus. Lacordaire.
>
> Cette espèce a certains rapports par les dessins avec l'A. elegans de Waterh.

Of this species I have only one male specimen which I obtained in exchange from the Dresden Museum. More material of both sexes of *M. lenis* may confirm the probability that the following species is only to be considered as a subspecies of the above.

Metapocyrtus (Orthocyrtus) ostentator Heller. Plate 1, fig. 4, ♀; Plate 5, fig. 17, ♂, fig. 18, ♀ (lateral view); Plate 12, fig. 18.

Orthocyrtus ostentator HELLER, Deutsche Ent. Zeitschr. (1916) 283.

Glossy black, with metallic greenish golden scale markings. Nearly related to *M. lenis* Chevrolat and the markings similar in position as in that species, but the scale markings larger and more confluent. In sculpture of rostrum, prothorax, and elytra very similar to the above, but more strongly pronounced. Prothorax with anterior marginal band confluent with the scale patch at each lateral margin, the elongate dorsolateral spots broader, and discally mostly an additional small elongate scale spot. Elytra with the spots at base, as well as a marginal stripe and apical stripelike spot confluent; the other spots larger than in *M. lenis* Chevrolat. In the male mesosternum, metasternum, and first abdominal sternite beset with fine and long, sparsely scattered hair, metasternum laterally with a scale spot, as in the former species.

Male, length, 10.5 to 11 millimeters (without rostrum); width, 4.7 to 5.6. Female, length, 11.8 to 13 millimeters (without rostrum); width, 5.4 to 6.2.

LUZON, Tayabas Province, Malinao (*Baker*): Laguna Province, Paete and Lilio (*Schultze*).

The males of *M. ostentator* in general form are stouter than the males of *M. lenis*.

Metapocyrtus (Orthocyrtus) quadrulifer Waterhouse. Plate 1, fig. 1, ♀; Plate 4, fig. 3, ♂ (lateral view); Plate 12, fig. 51, ♀ (head).

Apocyrtus quadrulifer WATERHOUSE,[8] Ann. & Mag. Nat. Hist. 9 (1842) 304.

Metapocyrtus (*Orthocyrtus*) *quadrulifer* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 348.

Metapocyrtus (*Orthocyrtus*) *pachyrrhynchoides* HELLER, Philip. Journ. Sci. § D 10 (1915) 220, pl. 1, figs. 1, 2.

Glossy black, prothorax and elytra with pale greenish or yellow scale line markings. Rostrum divergent toward apex, finely and confusedly punctured in apical half, more sparsely in basal half, the latter with a shallow medial depression and an indistinct groove; at base a sharply pronounced transverse groove. Front with a few scattered punctures and a short but sharply defined medial groove, mostly absent in the male. Sides of head below eye with oblong scale spot. Prothorax broader than long, sides evenly rounded, finely and scatteredly punctured, a scale line along anterior and posterior margin confluent with a longitudinal dorsolateral line and another line at each lateral margin. Elytra ovate, irregularly and distantly punctured. Each elytron with the following greenish yellow scale markings: A dorsolateral longitudinal and a submarginal line extending from near base to near apex, there confluent with a short longitudinal curved line located more dorsally; near base a transverse line confluent with the longitudinal lines; another transverse line at basal third and still another at apical third, both of which are confluent with the longitudinal lines in the male, but more or less interrupted or forming spots in the female; another short longitudinal line located more dorsally and extending from base to first transverse line; furthermore, a sutural line confluent with second and third transverse lines. In the female still another longitudinal line is located in the middle between the dorsolateral and marginal lines, connecting also the second and third transverse lines. Mesosternum, metasternum, and first and second abdominal sternites laterally with a scale spot. Anal sternite in the male very coarsely punctured, in the female with scattered punctures and transverse wrinkles. Legs black, femora with a yellowish ring spot near apex.

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[8] The original short Latin diagnosis of Waterhouse follows:

Apocyrtus quadrulifer.

Ap. niger; thorax punctato; elytris parce punctatis; capitis notâ suboculari, et rostri notâ basali, necnon thoracis margine lineisque duabus longitudinalibus, pallide caeruleo-viridibus; sic et elytrorum lineas, areas quatuordecim, plerasque quadratas, cirumdantibus; areis duabus suturalibus. Long. corp. 6 lin.; lat. 3 lin.

Male, length, 13 to 14 millimeters (without rostrum); width, 5.5 to 6. Female, length, 15 to 17 millimeters (without rostrum); width, 7 to 7.8.

LUZON, Laguna Province, Mount Banahao (*Baker; Schultze*); Lilio and Nagcarlan (*Schultze*).

Study of a large series of this extraordinary species (extraordinary on account of its superficially truly remarkable *Pachyrrhynchus* aspect) shows that in females the line markings on the elytra are more variable, usually broader, and the transverse lines more or less interrupted.

The type of this species in the British Museum was, upon my request, kindly compared by Mr. Arrow with *M. pachyrrhynchoides* with the result that the latter proved to be identical with *M. quadrulifer*.

Metapocyrtus (Orthocyrtus) subquadrulifer Waterhouse. Plate 1, fig. 16, ♂; Plate 4, fig. 17, ♀ (lateral view).

Apocyrtus subquadrulifer WATERHOUSE,[9] Ann. & Mag. Nat. Hist. 9 (1842) 304.

Metapocyrtus (*Orthocyrtus*) *subquadrulifer* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 348.

Metapocyrtus (*Orthocyrtus*) *bakeri* HELLER, Philip. Journ. Sci. § D 10 (1915) 221, pl. 1, figs. 3, 4.

Glossy black, with brilliant pale green line markings. Related to *M. quadrulifer* Waterhouse, but smaller. Rostrum as in that species, in basal half with an oblong depression and scale spot; front with a long medial groove and an irregular scale spot, another at sides of head below eye. Prothorax as long as broad, dorsally scatteredly punctured, a broad scale line along anterior margin confluent with a dorsolateral longitudinal stripe and another stripe at each lateral margin, at posterior margin a fine scale line, dorsally interrupted. Elytra irregularly striate-punctate, each elytron with the following markings: A transverse scale line at base confluent with a dorsolateral longitudinal line and a marginal stripe, both confluent at apex; at basal third and apical third a transverse line more or less interrupted; between the latter transverse lines and in the middle between the dorsolateral and marginal stripes another short longitudinal line. Mesosternum, metasternum, and first and second abdominal sternites laterally with a pale green scale spot. Legs black, femora with a more or less interrupted ring spot near apex. Tibiæ dorsally beset with reddish golden scales.

Male, length, 10.7 millimeters (without rostrum); width, 4.8. Female, length, 11.6 millimeters (without rostrum); width, 5.2.

LUZON, Laguna Province, Mount Banahao (*Baker*); Mount Maquiling (*Schultze*).

This species has a certain superficial resemblance to *M. mandarinus* Heller and *M. pseudomandarinus* Heller, but both of these are smaller. *Metapocyrtus bakeri* Heller I surmised to be identical with *M. subquadrulifer;* upon my request Mr. Arrow kindly compared the former species with the type of the latter and found my surmise to be correct.

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[9] The original diagnosis of Waterhouse is as follows:

Apocyrtus subquadrulifer.

Ap. niger, thorace suprà punctulato; elytris distincte punctatis; capitis notâ suboculari et rostri nota basali, necnon thoracis margine lineisque duabus metallicè viridibus, sic et elytrorum lineis areas undecim plerasque oblongas circumdantibus; areis trĭbus suturalibus. Long. corp. 6 lin.; lat. 2½ lin.

Metapocyrtus (Orthocyrtus) orbiferoides Schultze.

Metapocyrtus (Orthocyrtus) orbiferoides SCHULTZE, Philip. Journn. Sci. § D 13 (1918) 374, pl. 1, fig. 7, ♀.

Glossy black, elytra with pink scales and bare spots. Rostrum irregularly scatteredly punctured, less so toward front, with a large, medial, oblong-triangular depression terminating in a punctiform impression on front. Prothorax as long as broad, greatest width before the middle, finely and scatteredly punctured. A narrow pale green scale stripe along anterior margin, continued along lateral and posterior margins, and terminating in an oblong dorsolateral spot, near posterior margin. Elytra striate-punctate, covered with pink scales, except the following bare areas: At basal half a large squarish spot at suture and another irregular spot on each elytron, forming an irregular crossband. Beyond the middle a series of five spots, one at suture and two on each elytron. The former and latter sutural spots narrowly confluent along suture. Another small bare spot at lateral margin apically and another at suture. Underside with a pale green spot at mesosternum and metasternum laterally. Legs sparsely and scatteredly punctured, finely rugose and setose.

Female, length, 13.5 millimeters (without rostrum); width, 6.7.

LUZON, Ilocos Norte, Mount Nagapatan (*Schultze*).

This species resembles very much *Pachyrrhynchus orbifer* Waterhouse, with which it was collected from the same plants.

Metapocyrtus (Orthocyrtus) tumoridorsum Chevrolat. Plate 2, fig. 17, ♀ (lateral view).

Apocyrtus tumoridorsum CHEVROLAT, Le Natur. (1881) 382.

Metapocyrtus (Orthocyrtus) tumoridorsum Chevrolat, HELLER, Philip. Journ. Sci. § D 7 (1912) 348, pl. 1, figs. 26, ♂, 26*a* ♀.

Black; prothorax and elytra with scattered bronze green scales. Rostrum longitudinally slightly convex, irregularly scatteredly punctured, with a broad and strongly pronounced medial groove in basal half, the latter confluent with the transverse basal groove which separates the rostrum from the slightly curved front. The latter sparsely and scatteredly punctured with a sharply defined medial groove and some scattered scales. Lateral margin of rostrum below dorsolateral edge with a deep elongate groovelike depression not confluent with antennal scrobe. Prothorax subglobular, broader than long, densely and irregularly rugosely punctured, a very fine hair arising from each puncture, sparsely beset with irregularly scattered scales which are more numerous at lateral margins. Elytra subovate, irregularly confluently rugosely punctured, a minutely fine hair arising from each puncture and beset with irregularly scattered pale bronze green scales which are more numerous toward base and toward lateral margins. Elytra in the female dorsoapically prolonged into an obtuse bifid protuberance, extending beyond apical sutural decline and apex, the latter not visible from above. Underside and legs very sparsely beset with scattered fine whitish hair.

Female, length, 11.3 millimeters (without rostrum); width, 5.

Philippines; exact locality unknown.

Of this interesting species I obtained in exchange from the Dresden Museum only one (female) specimen (ex coll. *J. Faust*).

This species was placed by Heller in the subgenus *Orthocyrtus* but from the form of the rostrum and the general aspect it seems to represent an intermediate form between the subgenera *Metapocyrtus* s. str. and *Artapocyrtus* Heller.

Metapocyrtus (Orthocyrtus) monstrosus sp. nov. Plate 1, fig. 14, ♀; Plate 11, fig. 13, ♀ (lateral view).

Head, prothorax, legs, and underside black, elytra dark reddish brown. Rostrum dorsally flattish depressed and densely and irregularly confluently punctured. Female with a well-pronounced medial groove in basal half which is continued to front and forms a cross figure with the equally well-pronounced basal transverse groove. The dorsolateral edges of rostrum rounded and with coarser punctures, the area in front of eye glabrous, separated from dorsolateral edge by a deep groovelike depression. Rostrum dorsally sparsely beset with fine whitish hair, lateral margins and underside more densely beset with longer and coarser setæ. Front irregularly scatteredly punctured. Prothorax subglobular, transverse, three-fourths as long as broad, sides strongly bulgingly rounded; coarsely and irregularly confluently punctured except a narrow elongate discal area which is nearly impunctate in the female. In both sexes, arising from the punctures, are short whitish hairs. At sides in the middle and at anterior margin laterally an irregular small patch of greenish white scales. Elytra subovate; female at the beginning of apical decline with a strongly developed, posteriorly projecting hump, and in both sexes with rather coarse longitudinal rows of punctures in shallow grooves, the interstices slightly swollen. These punctures approximate each other closely and are more regular in the male. On each elytron first and ninth or marginal rows consist of single rows of punctures, but second to eighth rows consist of two irregular double puncture rows, more pronounced in the female. A small greenish white hair arises from each puncture, the hairs gradually increasing in length toward apex; they are very long subapically at lateral margins, and longest below sutural hump in the female. Basal margin of elytra to humeral angle swollen. The reddish brown color turns blackish along the margins. Each elytron with four small and indistinct greenish white scale spots, one basally at humeral angle, another at basal fourth of lateral margin, and two at middle in fifth and sixth interstices. Coxæ, prosternum, mesosternum, metasternum, and first abdominal sternite (partially) densely beset with rather long pale ochraceous setæ, particularly in the male; abdominal sternites and legs sparsely and scatteredly beset with short creamy white hair. Underside of fore tibiæ irregularly denticulate.

Female, length, 14 millimeters (without rostrum); width, 6.4. Male, length, 10.7 to 12 millimeters (without rostrum); width, 4.9 to 5.1.

LUZON, Nueva Ecija Province, Santa Fe Road, near kilometer 210 (*Schultze; Duyag*).

In spite of very diligent search on several trips to the above-named locality I was able to obtain only two female specimens of this remarkably characteristic species. The elytra of the female of this species in general form are somewhat like those of the female of *M. tumoridorsum* Chevrolat; but from its general color, sculpture, and size it is easily distinguishable from the latter and from any other species, as it is a rather isolated species of this genus. One of the female specimens has strongly pronounced scale markings, differing in this respect from the typical female and from the male. Therefore I designate this form—

Metapocyrtus (Orthocyrtus) monstrosus var. speciosus var. nov.

Prothorax and elytra with golden scale markings. Prothorax with two elongate triangular dorsolateral spots reaching from base forward to about the middle. Elytra with a narrow spot-like interupted band at base, another in the middle, and more or less abbreviated, longitudinal stripes of which one, located between the second and third puncture rows, is almost continuous from base to near apex.

Female, length, 12.7 millimeters (without rostrum); width, 5.4.

Subgenus **Metapocyrtus** Heller

Metapocyrtus HELLER, Philip. Journ. Sci. § D 7 (1912) 303, 351.

Fairly large to medium-sized species. General characters as given for the genus.

Typical species, *M. impius* Erichson.

Metapocyrtus (Metapocyrtus) impius Erichson. Plate 2, fig. 21, ♂, fig. 22, ♀ (lateral view).

Apocyrtus impius ERICHSON, Nov. Act. Leop. Car. 16 (1834) Suppl. 256, pl. 48, fig. 9; SCHOENHERR, Gen. Curc. 5 (1839) 827.
Apocyrtus longipes CHEVROLAT, Le Natur. 3 (1881) 363.
Metapocyrtus (Metapocyrtus) impius Erichson, HELLER, Philip. Journ. Sci. § D 7 (1912) 353.

Black, with scattered greenish white scales. Rostrum dorsally densely, toward base coarsely subrugosely punctured, with a medial depression and two indistinct divergent ridges; fine, transversely directed, white hair arising from punctures. Basal transverse groove slightly connected with a pitlike depression on side of rostrum in front of eye. Front subrugosely punctured and with a fine medial groove. Prothorax subglobular, coarsely and very irregularly subrugosely punctured, beset with fine whitish hair and sparsely scattered whitish scales usually along anterior and posterior margin and forming an irregular spot at each lateral margin. Elytra subovate, irregularly and subrugosely punctate-striate, the interstices slightly swollen. A very fine hair arising from each puncture, the hairs becoming longer toward apex. Numerous greenish white scales scattered over surface but more congregated at the shallow furrows and toward the lateral margins. In both sexes basal margin and suture basally distinctly swollen. Female elytra with a strongly developed bifid roundish sutural protuberance at beginning of apical decline, beset with a small tuft of setæ; at apex with an obtuse excision within which the suture forms a short obtuse point. Apex in male rounded. Legs black, moderately densely beset with whitish setæ.

Male, length, 8 to 8.9 millimeters (without rostrum); width, 2.9 to 3.3. Female, length, 9.5 to 11 millimeters (without rostrum); width, 3.9 to 4.4.

LUZON, Laguna Province, Mount Banahao (*Baker; Banks; Schultze*); Bataan Province, Limay (*Schultze*).

Metapocyrtus (Metapocyrtus) striatus Heller. Plate 7, fig. 12, ♂, fig. 13, ♀ (lateral view).

Metapocyrtus (Metapocyrtus) striatus HELLER, Philip. Journn. Sci. § D 7 (1912) 353, 364.[10]

Black; elytra with shallow longitudinal furrows beset with scattered pale pink scales. Related to *M. impius* Erichson. Rostrum dorsally coarsely and confluently punctured, the sculpture finer toward apex; in male with a groovelike medial depression, which is broad and flattish anteriorly; female, rostrum dorsally swollen, particularly near the deep basal transverse groove, in basal half with a strongly pronounced oval depression. In both sexes some fine whitish hairs arise from the punctures. Sides of rostrum with a longitudinal groove parallel to dorsolateral edge. Front scatteredly punctured, with a fine medial groove and some scattered scales. Prothorax broader than long, the greatest width slightly before the middle, very coarsely and irregularly confluently punctured, with some irregularly scattered scales, the scales denser at lateral margins and forming a narrow band along anterior margin. Elytra coarsely punctate-striate, the punctures in slightly irregular double rows, the interstices slightly swollen and smooth. In the male the shallow furrows beset with scattered scales forming interrupted lines, in the female the furrows with larger scaleless intervals, so that the scale markings produce the effect of irregular transverse bands. Lateral margin near apex and apical decline beset with scattered and rather long whitish setæ, particularly along the swollen sutural-apical decline in the female. Apex of elytra in the male evenly rounded, in the female each elytron at apex with a short curved excision. Hind femora, in the male only, reaching beyond apex of elytra.

Male, length, 9 to 10 millimeters (without rostrum); width, 4 to 4.8. Female, length, 11.4 millimeters (without rostrum); width, 5.

ROMBLON (*McGregor*).

Metapocyrtus (Metapocyrtus) sibuyanensis sp. nov. Plate 7, fig. 15, ♀ (lateral view).

Black; prothorax and elytra scattered with very pale bluish or greenish white scales, forming on the latter in the middle an indistinct and irregular narrow transverse band. Related to

[10] In Heller's original description (page 364) the name of this species is given as "*strictus*" which I take to be a typographical error.

M. striatus Heller but distinguished from the latter at once by the different sculpture, particularly of the elytra. Female, rostrum similar in form to but longer than in *M. striatus,* dorsally more uniformly swollen and the sculpture less pronounced than in the latter. Prothorax coarsely and irregularly confluently punctured with sparsely scattered scales, the latter more numerous at lateral margins. Elytra coarsely and shallowly irregularly striate-punctate with a very fine whitish hair arising from each puncture, the hairs longer toward apex. In basal half of elytra (female) with sparsely and irregularly scattered scales, in the middle an indistinct narrow transverse scale band formed by small irregular scale patches, in apical half the scales more densely scattered, forming small irregular patches. Apical sutural decline indistinctly swollen and sparsely beset with coarser setæ. Each elytron in the female at apex with a short curved excision, but suture at apex strongly swollen, forming a distinct projection within the excisions.

Female, length, 9.3 to 10.8 millimeters (without rostrum); width, 4 to 4.8.

SIBUYAN (*Baker*).

Metapocyrtus (Metapocyrtus) macgregori Heller. Plate 2, fig. 25, ♀, fig. 26, ♂ (lateral view).

Metapocyrtus (*Metapocyrtus*) *macgregori* HELLER, Philip. Journ. Sci. § D 7 (1912) 363.

Black, moderately glossy, elytra with a narrow, irregular, pale greenish scale band in the middle, interrupted at suture. Rostrum one and one-half times as long as broad, coarsely and confluently punctured, the punctures finer toward apex, and sparsely beset with fine whitish hair, dorsally a medial groove and toward each side with another longitudinal groovelike depression. Sides of rostrum before eyes with a deep groove confluent with antennal scrobe. Front coarsely and scatteredly punctured with a fine medial groove. Prothorax longer than broad, subglobular, relatively much larger in the male than in the female, dorsally densely granulate; granules roundish and slightly polished off; with a fine medial groove, the granulation gradually obsolete toward and at lateral margins, the latter with some sparsely scattered scales. Elytra subelliptical, in the male as broad as prothorax, in the female broader, confusedly punctured and somewhat rugose near base but toward apex more regularly and more finely punctate. At the middle a narrow irregular transverse scale band, an irregular transverse spot at apical third, and some scattered scales near base along lateral margin and near apex. Underside beset with fine scattered hair, mesosternum and metasternum laterally with a patch of scattered scales.

Male, length, 12.5 millimeters (without rostrum); width, 4.8.
Female, length, 10.7 millimeters (without rostrum); width, 4.5.
CALAYAN, Babuyan group (*McGregor*).

Metapocyrtus (Metapocyrtus) whiteheadi sp. nov. Plate 6, fig. 16, ♂, fig. 17, ♀ (lateral view).

Black, without any scale markings; related to *M. macgregori* Heller and very similar in general form to the latter. Rostrum one and one-half times as long as broad, coarsely and confusedly punctured, more finely toward apex, with an indistinct medial groovelike depression and toward each side an indistinct narrow ridge. Antennal scrobe confluent with a groovelike depression before eye. Rostrum and front beset with fine whitish hair, front rather coarsely punctured and with a medial groove. Prothorax longer than broad, less subglobular than in *M. macgregori*, dorsally with an indistinct medial groove and uniformly polished off granulate, this sculpture gradually obsolete toward lateral margins, changing to fine scattered punctures, some minutely fine short white hair arising from the punctures. Elytra subelliptical, in the female longer and more pointed toward apex; irregularly and confusedly punctured, the punctures laterally more or less confluent and subtuberculate, particularly toward base. In the female each elytron near base laterally with a more strongly pronounced tubercle and the lateral basal angle strongly swollen. The sculpture toward apex less pronounced, changing to scattered, nearly obsolete punctures, from which arise minutely fine white hairs. Apical sutural decline in the female with a slight swelling. Legs also beset with fine white hair.

Male, length, 11 millimeters (without rostrum); width, 4.2.
Female, length, 11.2 millimeters (without rostrum); width, 4.5.
Northeastern Luzon (*J. Whitehead*); British Museum.

Metapocyrtus (Metapocyrtus) batanensis sp. nov. Plate 2, fig. 27, ♀, fig. 28, ♂ (lateral view).

Black, elytra with traces of an irregular transverse band in the middle, the scales extremely small and pale grayish pink. Related to *M. macgregori* Heller. Rostrum similar to that of the latter, dorsally very coarsely and confusedly punctured, with a deep groovelike medial depression, at each side of which is a strongly pronounced glossy ridge; the two ridges are divergent toward apex, laterad of each ridge and between each and the dorsolateral margin of rostrum (which is also swollen) an elongate shallow depression. Lateral margins of rostrum with a deep groove before eyes confluent with antennal scrobe. Front coarsely and confusedly punctured, with a fine medial groove. Prothorax longer than broad, densely roundish granulate, the granulation extending to lateral margins, and more irregular and confluent in the male. Sides with a few irregularly scattered scales. Elytra subelliptical; in the male rounded at apex, in the female obtusely pointed; irregularly and confusedly punctate and rugose, with regular longitudinal furrows and shallow ridges, the latter in the female near base with some fine scattered granules. The furrows in both sexes beset with minutely fine scalelike whitish hair, more strongly pronounced toward apex. In the middle an irregular interrupted transverse band consisting of scattered scales. Apical decline of elytra and lateral margin near apex with scattered fine whitish setæ.

Male, length, 10.6 millimeters (without rostrum); width, 4. Female, length, 11.6 millimeters (without rostrum); width, 4.8.

BATAN, Batan group (*McGregor*).

This species is related to *M. macgregori* Heller and *M. whiteheadi* sp. nov., from both of which it is easily distinguishable by the furrows on the elytra and the different shape of the latter. *Metapocyrtus batanensis* also bears a superficial resemblance to *M. striatus* Heller, but the former, particularly in the female, has the elytra slenderer and more pointed toward apex. The above species, by the sculptural characters of prothorax and elytra, represent intermediate forms leading from the subgenus *Metapocyrtus* to the subgenus *Trachycyrtus*.

Metapocyrtus (Metapocyrtus) pilositibialis sp. nov. Plate 7, fig. 21, ♂ (lateral view).

Black, with pale golden scale markings. Rostrum very coarsely and irregularly rugosely punctured with an indistinct medial depression, two slightly divergent ridges, and another elongate depression next to dorsolateral edge. Below the latter on side of rostrum a shallow pitlike depression. Front slightly concavely depressed, entirely beset with a scale patch. Prothorax strongly subglobular, very coarsely subrugosely punctured with a well-pronounced medial groove, the area next to posterior margin smooth. Along anterior margin some scattered scales which are more or less confluent with a small scale patch at each lateral margin, and dorsolaterally an elongate crescent-shaped scale spot. Elytra subovate, irregularly and very coarsely striate-punctate, with a minutely fine hair arising from each puncture. Each elytron with an irregular oblong scale spot basally, between second and fourth puncture rows; at lateral margin an irregular stripe which is expanded spotlike basally; in the middle a transverse row of three or four spots which have a tendency to become confluent; another transverse row of three spots at apical third, and one subapical spot. Mesosternum, metasternum, and first two abdominal sternites transversely rugose and beset in the middle with a patch of long pale brownish hair, third and fourth sternites sparsely beset with hair, the last sternite very coarsely punctured and more densely beset with brownish hair. Legs black, femora very sparsely beset with short brownish setæ; tibiæ, particularly the anterior, ventrally with a number of blunt teeth and densely beset with long brownish setæ.

Male, length, 11.2 millimeters (without rostrum); width, 4.8.

NEGROS, Mount Canlaon (*Banks*).

Metapocyrtus (Metapocyrtus) brevicollis Chevrolat. Plate 2, fig. 13, ♀, fig. 14, ♂ (lateral view).

Apocyrtus brevicollis CHEVROLAT, Le Natur. 3 (1881) 363.

Metapocyrtus (*Metapocyrtus*) *brevicollis* Chevrolat, HELLER, Philip. Journ. Sci. § D 7 (1912) 353.

Black; prothorax and elytra with pale greenish white scale markings. Rostrum densely and irregularly rugosely punctured, shallowly depressed in basal half with an indistinct medial groovelike depression. Basal transverse groove rather indistinct. Front coarsely, irregularly, scatteredly punctured with a fine medial groove. Prothorax subglobular, much broader than long, sides bulgingly rounded, greatest width slightly before the middle, in the male almost as broad as elytra; coarsely and rather uniformly, confluently, subrugosely punctured, with a fine hair arising from each puncture. Anterior submarginal groove rather well pronounced, the inclosed marginal area more finely irregularly punctured and beset with scattered scales which are usually more numerous in the male. Sides of prothorax, above anterior coxæ, with an irregular patch of more or less densely scattered scales. Elytra subovate, in the male the apical sutural decline uniformly and gradually curved to apex, coarsely and rather densely irregularly punctured; female with a strongly pronounced hump at apical sutural decline, also coarsely but less densely punctured in irregular double rows. In both sexes a very fine hair arising from each puncture, the hairs becoming longer at apical region. In the female, below the subapical hump, a subsutural row of still longer pale whitish hair. In both sexes a narrow irregular basal scale band continued more or less interruptedly along outer margin; at about the middle another irregular narrow transverse band consisting of small irregular scale spots, more pronounced in the female; at apical third some scattered scales, forming indistinct irregular patches. Mesosternum, metasternum, and first abdominal sternite in the middle densely beset with creamy white hair, the latter more ochraceous and denser in the male. Legs sparsely whitish setose. Penis structure, Plate 12, fig. 9.

Male, length, 8.9 to 9.8 millimeters (without rostrum) ; width, 4 to 4.5. Female, length, 10.2 to 10.5 millimeters (without rostrum) ; width, 4.8 to 4.9.

LUZON, Nueva Ecija Province, Caraballo Mountains (*Schultze*).

Metapocyrtus (Metapocyrtus) niger sp. nov. Plate 3, fig. 29, ♂, fig. 30, ♀ (lateral view) ; Plate, 12, figs. 47, 48.

Almost uniformly black, female with very few indistinct grayish scales on elytra near base. Rostrum dorsally densely and confluently punctured, the punctures finer toward apex; in the male dorsally in basal half slightly concave with a broad groovelike medial depression, no dorsolateral edge present, but gradually rounded to upper margin of antennal scrobe. Basal transverse groove sharply defined and continued to lateral margins, separating the coarsely and confluently punctured rostrum from the glabrous side of head some distance anteriorly of eye. Rostrum in the female dorsally at base slightly swollen, the medial groove less pronounced, the basal transverse groove much more strongly pronounced. Front scatteredly punctured and with a sharply defined medial groove in both sexes. Prothorax subglobular, relatively larger in the male; in the latter as broad as or slightly broader than elytra; very coarsely and irregularly transversely wrinkled, more strongly in the male, the latter discally with an indistinct groovelike medial depression and the anterior submarginal groove much more strongly developed than in the female. Elytra subovate, irregularly striate-punctate, apical sutural decline in the male uniformly rounded; female at the beginning of apical slope with a small indistinct sutural swelling, beset with a small bifid tuft of pale fawn colored setæ, elytra at apex (female only) terminating in two small and short obtuse triangular points. Apical region in the female with a minutely fine whitish hair arising from each puncture. Legs sparsely beset with fine whitish setæ. Penis structure, Plate 12, fig. 5.

Male, length, 10.8 to 11.2 millimeters (without rostrum); width, 4.6 to 4.8. Female, length, 11.6 millimeters (without rostrum); width, 5.

POLILLO, (*Schultze*).

Metapocyrtus (Metapocyrtus) limayensis sp. nov. Plate 7, fig. 27, ♂, fig. 28, ♀ (lateral view).

Black, with small and ill-defined bronzy greenish spots; related to *M. niger* sp. nov. but slenderer than the latter. Rostrum in the male slightly longer than in the female, in form very similar to the above but the sculpture less coarse and the basal transverse groove continued to lateral margins. Prothorax subglobular, in the male relatively much larger than in the female, in the former almost as broad as elytra, coarsely and irregularly transversely wrinkled, with a more or less distinct medial groove in the male. A few scattered scales along anterior margin, a small irregular scale spot dorsolaterally, and a patch of scattered scales at each lateral margin. Elytra subovate, irregularly striate-punctate, in the male rounded at apex, in the female at the beginning of apical slope with a small bifid sutural swelling beset with a short cream colored tuft of setæ, elytra at apex in the female terminating in two short obtuse and divergent spines. Small irregular scale patches form three transverse rows; the basal row with two patches, a medial row with two, and another row at apical third with two or three small patches, besides a larger oblong lateral marginal patch in the middle. Legs very sparsely beset with fine whitish setæ.

Male, length, 10.2 to 10.7 millimeters (without rostrum); width, 4.2 to 4.4. Female, length, 9.5 to 10.3 millimeters (without rostrum); width, 4.1 to 4.3.

LUZON, Bataan Province, Mountains near Limay (*Schultze*).

This species is readily differentiated from *M. niger* by the markings on the elytra, the more-regular and less-coarse sculpture of the latter, and in the female by the two pronounced short obtuse spines at apex, which are only two very short obtuse triangular points in *M. niger*. Both species seem to represent intermediate species between the subgenus *Metapocyrtus* s. str. and the subgenus *Dolichocephalocyrthus* subg. nov.

Metapocyrtus (Metapocyrtus) gregarius sp. nov. Plate 2, fig. 23, ♀, fig. 24, ♂ (lateral view).

Black; prothorax and elytra with moderately densely scattered pale greenish bronze scales, which are more uniformly distributed in the male but have a tendency to form indistinct bands on the elytra of the female. In general aspect very much resembling *M.* (*Trachycyrtus*) *profanus* Erichson but distinguishable from the latter by the different sculpture. Rostrum densely and irregularly punctured, in the male very slightly concavely depressed in basal half and with an indistinct elongate medial depression; in the female basally slightly swollen; the basal transverse groove in both sexes confluent with an elongate triangular groovelike depression at the lateral margin below the dorsolateral edge, which is not confluent with antennal scrobe. Front irregularly sparsely punctured with a sharply defined medial groove. Prothorax subglobular, slightly broader than long, in the male as broad as elytra, densely and uniformly roundish granulate, between the granulations with sparsely scattered scales and very fine, short whitish hair. The scales more numerous at lateral margins. Elytra oblong subovate, coarsely and irregularly rugosely punctate; fine short hair arising from the punctures, and more or less densely beset with scattered scales. The latter more uniformly distributed in the male, but in the female elytra forming at base, in the middle, and at apical third denser but indistinct, cloudy transverse bands. Elytra in the male with apical decline uniformly curved, at apex rounded, female with apical decline more gradual, the elytra toward apex prolonged, subapically slightly constricted. Both sexes at apical decline with a subsutural row of a few longer hairs distantly apart. Underside in the female sparsely beset with scattered whitish hair, in the male middle of mesosternum and metasternum more densely beset with fine hair; legs whitish setose. Penis structure, Plate 12, fig. 20.

Male, length, 9 to 9.2 millimeters (without rostrum); width, 3.3 to 3.5. Female, length, 8.5 to 9.5 millimeters (without rostrum); width, 3.7 to 4.

LUZON, Laguna Province, Paete: Bataan Province, Limay (*Schultze*); Rizal Province, Mount Lumutan (*M. Ramos*).

This is a common species easily confounded with *M. profanus*, together with which it was collected at Paete. The species mentioned can be readily distinguished by the rostrum having dorsally a medial and toward each side a dorsolateral elongate depression, between the latter of which two indistinct ridges are formed.

Metapocyrtus (Metapocyrtus) subgregarius sp. nov. Plate 2, fig. 29, ♂, fig. 30, ♀ (lateral view).

Black, with scattered pale bronzy greenish scales on prothorax and elytra. Very nearly related to *M. gregarius* sp. nov., but stouter. Rostrum not as densely and more regularly punctured, in the female basally more strongly swollen than in the latter species. Prothorax with the granulation coarser; female in anterior half with an indistinct medial groove, the fine short hair between the granulations less pronounced. Elytra in form similar to *M. gregarius* sp. nov. but stouter, the sculpture slightly coarser, and the scattered scales forming more or less cloudy bands in the female.

Male, length, 8 millimeters (without rostrum); width, 3.1. Female, length, 8.8 to 10.7 millimeters (without rostrum); width, 3.9 to 7.6.

POLILLO (*McGregor; Schultze*).

This species also resembles and has the appearance of being a small specimen of *M. polilloensis* sp. nov. from the same locality, just as *M. gregarius* sp. nov. has a superficial resemblance to *M. luzonensis* sp. nov., both from Paete; the first and the last of these three species are distinguished by the larger size, the different sculpture of prothorax and elytra, and in the females having a sutural hump.

Metapocyrtus (Metapocyrtus) imitatus sp. nov. Plate 6, fig. 25, ♂, fig. 26, ♀ (lateral view).

Black; femora and tibiæ reddish brown, apically black, prothorax and elytra with moderately densely irregularly scattered pale greenish scales. In superficial aspect very similar to *M. (Artapocyrtus) longipenis* sp. nov. but at once distinguishable from the latter by the much smaller size and the differently shaped rostrum. Rostrum irregularly densely punctured and sparsely beset with fine whitish hair, basal half with an elongate medial depression and two moderately pronounced divergent longitudinal ridges, laterad of each of which is another elongate depression; basal transverse groove deep. Front obliterately punctured with some scattered scales and a sharply defined medial groove. Prothorax subglobular, broader than long, irregularly densely rugosely punctured with scattered pale greenish scales. Elytra subovate, coarsely and irregularly rugosely striate-punctate, also with moderately densely scattered scales which have a slight tendency to form very indistinct, cloudy, transverse bands, and at apical region with abbreviated rows of fine greenish hair. In the female near base laterally a large but shallow depression. Underside black, the latter and the legs sparsely whitish setose.

Male, length, 7.7 to 9.4 millimeters (without rostrum); width, 3.2 to 3.6. Female, length, 8.8 to 9.8 millimeters (without rostrum); width, 3.7 to 4.6.

BOHOL, Bilar (*Duyag*).

This species was found by my collector on the same plants with *M.* (*Artapocyrtus*) *longipenis.*

Metapocyrtus (Metapocyrtus) adaptatus sp. nov. Plate 11, fig. 25, ♂, fig. 26, ♀ (lateral view).

Black; legs reddish brown, except apex of femora and tibiæ and also tarsi which are black; prothorax and elytra with moderately densely irregularly scattered pale bluish white scales. Nearly related to *M. imitatus* sp. nov. but having also a great superficial resemblance to *M.* (*Artapocyrtus*) *diffusisquamosus* sp. nov., from the latter of which it is easily distinguished by the differently shaped rostrum and the smaller size. Rostrum relatively distinctly narrower than in *M. imitatus,* and much more finely irregularly punctured, in the basal half (particularly in the female) with a broad swollen longitudinal ridge and a more sharply defined medial groove; dorsolateral edges parallel and more acute than in the last-mentioned species in which the edges are more rounded. Front sparsely punctured with a few scattered scales and a well-defined medial groove. Prothorax subglobular, irregularly rugosely punctured, the rugose sculpture less pronounced than in *M. imitatus.* Elytra subovate, irregularly subrugosely striate-punctate, the punctures smaller and the rugosities much less pronounced than in the last-mentioned species. Apical region also with abbreviated rows of fine whitish hair, in the female these hairs forming a denser oval patch at the sutural decline. The irregularly scattered pale bluish white scales on prothorax and elytra are less numerous than in the former species and have a tendency to form a very indistinct narrow cloudy transverse band in the middle of the elytra.

Male, length, 7.5 to 9.4 millimeters (without rostrum); width, 3 to 3.8. Female, length, 9.4 to 9.7 millimeters (without rostrum); width, 4 to 4.3.

MINDANAO, Surigao Province, Surigao (*Schultze*).

This species was collected from the same plants with *M.* (*Artapocyrtus*) *diffusisquamosus* sp. nov.

Metapocyrtus (Metapocyrtus) polilloensis sp. nov. Plate 2, fig. 11, ♀, fig. 12, ♂ (lateral view); Plate 12, fig. 6.

Black; prothorax with sparsely scattered pale greenish white scales, the latter forming on elytra three very indistinct cloudy transverse bands. Related to *M. brevicollis* Chevrolat but also having a superficial likeness to *M. niger* sp. nov. Rostrum densely and coarsely punctured, a very fine whitish hair arising from each puncture in basal half, the latter slightly swollen, particularly in the female. Basal transverse groove deep, sides of rostrum with an elongate depression below dorsolateral edge, confluent with antennal scrobe. Front sparsely punctured, with a sharply defined medial groove. Prothorax subglobular, broader than long, in the male almost as broad as elytra, very coarsely and irregularly confluently rugosely punctured, a fine, short hair arising from each puncture, a narrow scale band at anterior margin, and some irregularly scattered scales at each lateral margin. Elytra subovate, coarsely and irregularly confluently punctured, a fine hair arising from each puncture, the hairs extremely short basally but gradually becoming longer toward apex. Scattered scales forming at base, before the middle, and at apical third indistinct and irregular, more or less cloudy transverse bands which are confluent along lateral margins. Elytra in the male shorter, apical sutural decline more abruptly curved; elytra in the female more prolonged, apical sutural decline with a small oblong hump beset with a scanty tuft of short creamy white setæ, at apex each elytron with a small curved excision, but the sutural termination forming a small knoblike swelling. In both sexes, at apical region the creamy white setæ rather long. Underside and legs sparsely whitish setose.

Male, length, 11.3 to 12 millimeters (without rostrum); width, 4.8 to 5.5. Female, length, 11.2 to 12.3 millimeters (without rostrum); width, 5 to 6.

POLILLO (*McGregor; Schultze*).

Metapocyrtus (Metapocyrtus) luzonensis sp. nov. Plate 2, fig. 15, ♀, fig. 16, ♂ (lateral view).

Black; prothorax and elytra with scattered pale greenish scales. Very nearly related to *M. polilloensis* sp. nov., but differing from the latter as follows: Sculpture on prothorax and elytra not as coarse and less strongly pronounced; rostrum and prothorax with the fine hairs arising from the punctures longer; scattered scales, on prothorax denser and more numerous, on elytra in the male rather uniformly dense, in female denser and the cloudy transverse bands more strongly pronounced. Female elytra also with a sutural bifid hump at apical third but the latter more roundish and slightly more acute than in *M. polilloensis;* apical excision smaller, the knoblike termination of suture less pronounced than in *M. polilloensis.* Both sexes in general form less stout and slenderer in build than the last-mentioned species.

Male, length, 9 to 10.3 millimeters (without rostrum); width, 4 to 4.3. Female, length, 10 to 12.5 millimeters (without rostrum); width, 4.8 to 5.5.

LUZON, Laguna Province, Paete (*Schultze; Baker 4549*).

In respect to this species and *M. polilloensis* it is a noteworthy fact that in numerous instances certain species of Coleoptera found in the region of Laguna are represented or replaced on Polillo Island by a superficially very similar yet well-differentiated and well-characterized species. Another striking example of this nature is *M. quadriplagiatus* Roelofs, from Laguna, Paete, and *M. octomaculatus* Schultze, from Polillo. Mr. E. D. Merrill informed me that he has also noted similar occurrences among plants from the two regions mentioned.

Metapocyrtus (Metapocyrtus) pilosus sp. nov. Plate 11, fig. 21, ♂, fig. 22, ♀ (lateral view).

Black; prothorax and elytra with scattered whitish scales and rather densely beset with short whitish hair. Nearly related to *M. luzonensis* sp. nov., the markings on the elytra also diffused very similarly to those in the latter species. Rostrum scatteredly punctured, a fine hair arising from each puncture, with a medial depression, laterad of which an indistinct slightly swollen ridge. Sides of rostrum below dorsolateral edge without any distinct triangular depression; in *M. luzonensis* the latter is deep and strongly pronounced. Basal transverse groove well defined, not interrupting the dorsolateral edge. Front scatteredly punctured and with a distinct medial groove. Prothorax subglobular, more strongly so in the male, in the latter also the prothorax relatively larger than in the female and slightly broader than the elytra. Coarsely confluently punctured, the interspaces transversely rugose, more densely beset with whitish hair, the latter longer than in *M. luzonensis*. Sides with scattered whitish scales which extend more sparsely upward along anterior and posterior margins and form an irregular indistinct patch dorsolaterally, particularly in the male. Elytra subovate, shorter in the male than in the female, very confusedly striate-punctate in irregular double rows. Fine hair arising from the punctures, the former longer and denser than in *M. luzonensis*. Female elytra at apical third without a distinct sutural hump as in the latter species, but with an indistinct oblong sutural swelling beset with a patch of short whitish setæ; apical termination forming a short obtuse triangular projection. Elytra with irregularly scattered whitish scales which are denser at lateral margins and have a tendency to form a very indistinct cloudy transverse band at base, middle, and apical third. Underside and legs beset with fine scattered silky whitish hair, the latter longer and denser than in *M. luzonensis*.

Male, length, 9 to 10.3 millimeters (without rostrum); width, 3.6 to 4.2. Female, length, 10.7 to 11.3 millimeters (without rostrum); width, 4.5 to 4.7.

LUZON, Nueva Vizcaya Province, Caraballo Mountains, near Balete Pass, 900 meters altitude (*Schultze*).

Metapocyrtus (Metapocyrtus) virgatus Heller. Plate 1, fig. 7, ♀; Plate 7, fig. 14, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *virgatus* HELLER, Philip. Journ. Sci. § D 7 (1912) 355, 369.

Black, glossy, with pale greenish golden scale markings. Rostrum apically densely and finely irregularly, toward base coarsely and rugosely punctured, with a groovelike medial depression beset with an oblong scale spot; basal transverse groove moderately pronounced. Front scatteredly punctured with a sharply defined medial groove and some scattered scales. Prothorax subglobular, as broad as long in the male, polished off but somewhat transversely rugosely granulate, the region along posterior submarginal groove smooth; in the female very coarsely transversely rugosely punctured; in both sexes with a narrow anterior marginal scale band confluent with a large scale patch at each lateral margin and from the latter another transverse band slightly behind the middle which is discally interrupted. Elytra subovate, coarsely and somewhat irregularly punctate-striate; in the female the interstices slightly swollen, with the pale greenish golden scales forming irregular longitudinal stripes, alternating with fine bare stripes, and more or less interrupted by a transverse bare spot at basal third and at middle laterally. Another bare area is mostly present along suture in basal half and apical third, and still another bare patch is usually present subapically at lateral margin. Apical region in the female with some scattered, pale creamy, suberect hair. Underside and legs sparsely beset with fine whitish hair, metasternum in the male in the middle with a tuft of yellowish hair.

Male, length, 10 millimeters; width, 4.2. Female, length, 11.3 to 12.5 millimeters (without rostrum); width, 4.7 to 5.7.

NEGROS, Occidental Negros, Mount Canlaon, Bureau of Science accession No. 6251 (*Banks*). PANAY, Antique Province, mountains near Culasi (*McGregor; my collector*).

A female specimen collected together with the type, a male from Mount Canlaon, Occidental Negros, agrees perfectly in every detail with three females from Panay. This species is variable with reference to the bare markings on the elytra; it has a truly remarkable superficial resemblance to the following smaller, related but distinct species.

Metapocyrtus (Metapocyrtus) subvirgatus sp. nov. Plate 7, fig. 23, ♂, fig. 24, ♀ (lateral view).

Black, with pale greenish golden scale markings, nearly related to *M. virgatus* Heller. Rostrum irregularly coarsely punctured, a very fine hair arising from each puncture, a shallow medial depression with an indistinct groove in basal half and two indistinct divergent longitudinal ridges. Front irregularly scatteredly punctured with a well-pronounced medial groove and a few scattered scales. Prothorax subglobular, in both sexes as long as broad, rather regularly granulate, the granulation glossy and roundish, discally in anterior half an indistinct medial groove. At anterior margin an irregular scale band confluent with a very large scale patch at lateral margins, another broad transverse band in the middle, these bands broader and their edges less sharply defined than in *M. virgatus*. Elytra subovate, irregularly coarsely punctate-striate, nearly entirely covered with pale greenish golden scales which are interrupted by fine irregular longitudinal bare stripes that in some specimens have a slight tendency to form an irregular transverse bare band before and behind the middle. Female elytra with suture at base strongly dull, rugosely swollen, also basal margin at humeral angle strongly swollen, near base dorsolaterally a large and several smaller tubercles. Underside and legs sparsely beset with fine pale greenish setæ; male without a tuft of hair on metasternum.

Male, length, 9.4 to 9.5 millimeters (without rostrum); width, 3.7. Female, length, 9.2 to 10.8 millimeters (without rostrum); width, 3.8 to 4.2.

PANAY, Antique Province, mountains near Culasi (*McGregor*).

This species is at once distinguishable from *M. virgatus* by the different sculpture of the prothorax.

Metapocyrtus (Metapocyrtus) reyesi sp. nov. Plate 5, fig. 25, ♂, fig. 26, ♀ (lateral view); Plate 12, fig. 10.

Black, with blue scale markings. Rostrum densely and confusedly punctured, sparsely and finely setose, with a broad irregular medial groove in basal half, the transverse groove strongly pronounced. Prothorax subglobular, the greatest width before the middle, very coarsely, irregularly, and more or less confluently punctured. A narrow blue scale band at anterior margin and another transverse band at middle, both confluent with an irregular scale patch at each lateral margin. Elytra subovate, coarsely striate-punctate, the punctures forming somewhat irregular double rows. At basal fourth in the second interstice a narrow abbreviated longitudinal stripe continued along basal and lateral margin to near apex, where it is confluent with another longitudinal stripe located at apical third; the latter is again confluent with an irregular transverse band; another transverse band at about the middle. These blue scale markings are more or less interrupted in the females. Underside (male) in the middle of metasternum and first abdominal sternite with a patch of rather long pale brownish hair. Legs dark brown to black, sparsely whitish setose.

Male, length, 11 to 11.5 millimeters (without rostrum); width, 4.3 to 4.8. Female, length, 11.6 to 13 millimeters (without rostrum); width, 4.8 to 5.8.

NEGROS, Occidental Negros, Fabrica (*L. J. Reyes; Schultze*).

The blue markings of this species disappear entirely in old specimens. I take pleasure in naming this species in honor of Mr. L. J. Reyes, wood technologist in the Bureau of Forestry.

Metapocyrtus (Metapocyrtus) erichsoni Chevrolat. Plate 5, fig. 13, ♂, fig. 14, ♀ (lateral view); Plate 12, fig. 12.

Apocyrtus erichsoni CHEVROLAT, Rev. Zool. (1841) 226; SCHOENHERR, Gen. Curc. 8² (1845) Suppl. 395.

Glossy black, with metallic greenish golden scale markings. Rostrum densely punctured, in general form similar in both sexes, longer than broad, slightly divergent toward apex, dorsally in the middle with a broad shallow depression, the dorsolateral edges in the broadest part distinctly swollen, toward base the surface forming a broad slightly swollen hump, beset with a large scale spot, the humplike swelling somewhat more strongly pronounced in the female. Sides of rostrum in front of eyes smooth, without any distinct groove or depression in either sex. Front scatteredly punctured, with a fine medial groove and an irregular scale spot. Prothorax subglobular, broader than long, rather uniformly moderately densely punctured. An anterior marginal scale band confluent with a scale patch at each lateral margin, behind the middle a transverse band, discally mostly interrupted and mostly not confluent with the lateral marginal patches. Elytra subovate, coarsely and irregularly striate-punctate; each elytron with three irregular transverse bands, which consist of more or less confluent spots; at base, in the middle, and at apical third these are confluent with an irregular marginal stripe, the latter furthermore confluent apically with a short subsutural stripe located at apical third. Underside and legs finely setose.

Male, length, 11.3 millimeters (without rostrum); width, 5. Female, length, 10 to 11.3 millimeters (without rostrum); width, 4.8 to 5.7.

BOHOL, Sevilla (*A. Celestino*).

Metapocyrtus (Metapocyrtus) gibbirostris Waterhouse. Plate 6, fig. 7, ♂, fig. 8, ♀ (lateral views); Plate 12, fig. 8.

Apocyrtus gibbirostris WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 308; 11 (1843) 247; HELLER, Philip. Journ. Sci. § D 7 (1912) 355.

Glossy black, with metallic greenish golden scale markings. Related to *M. erichsoni* Chevrolat. Rostrum densely and confusedly punctured; in the male dorsally flattish with an indistinct medial groove and a scale spot in basal half, the dorsolateral edges rounded off, the basal transverse groove prominent; female with a very prominent hump or knoblike projection in the middle near base, the hump laterally depressed and forming a triangular slope toward apical part of rostrum, at each side of the protuberance a large squarish pitlike depression. Front in both sexes sparsely punctured with a fine medial groove and an irregular scale spot. Prothorax broader than long, subglobular, dorsally coarsely and more or less confluently punctured, with a faintly indicated medial groove, the punctures obsolete toward base and at lateral margins. At anterior margin a scale band confluent with a large scale patch at each lateral margin dorsally, slightly behind the middle a broad and irregular transverse band, discally interrupted and not confluent with the lateral marginal patches. Elytra subovate, irregularly striate-punctate, with a broad irregular scale band at base continued as a marginal stripe to apex, in the female the latter narrower and more or less interrupted. At the middle another irregular transverse band confluent with the marginal stripe, and still another at apical third, from which a narrow subsutural stripe extends to apex where it becomes confluent with the marginal stripe. The transverse bands are interrupted at suture and in the female have a tendency to divide into more or less elongate spots. Arising from the punctures at apical decline some very fine whitish setæ.

Male, length, 10 to 11.5 millimeters (without rostrum) ; width, 4.3 to 4.7. Female, length, 11.4 to 11.8 millimeters (without rostrum) ; width, 4 to 5.6.

BOHOL, Bilar (*Duyag; Ramos*).

A female specimen of this species was compared with the type by Mr. Arrow and was forwarded to me. It agrees perfectly with a large series of specimens obtained only from the above locality.

The scale markings in this species as well as the sculpture of prothorax and elytra are extremely similar to those in *M. erichsoni* Chevrolat, but by the striking differences of the rostrum, particularly in the females, the two species are at once differentiated. The male rostrum in *M. erichsoni* is also broader than that of *M. gibbirostris.* On account of the above differences in the form of the rostrum the two species involved are certainly not identical and *M. gibbirostris* cannot be placed as a synonym of *M. erichsoni.*

Metapocyrtus (Metapocyrtus) mindorensis sp. nov. Plate 5, fig. 3, ♂, fig. 4, ♀ (lateral view).

Black, with greenish golden metallic scale markings. Rostrum and form and markings of elytra very similar to those of

M. gibbirostris Waterhouse, but smaller than the latter. Rostrum (male) densely and irregularly punctured, fine whitish hair arising from punctures, basal half with an oblong depression beset with a scale spot, the depression and spot continued to front. Latter not separated from rostrum by a transverse basal groove, but with a fine and indistinct medial groove. Female rostrum at base with a prominent, laterally depressed, knoblike protuberance, slightly more acute than in *M. gibbirostris*. Anteriorly of latter an elongate medial depression beset with scales. Prothorax in both sexes broader than long, sides strongly rounded, very coarsely and irregularly punctured. At anterior margin an irregular scale band confluent with a large scale patch at each lateral margin near base, toward each side dorsolaterally a more or less elongate triangular scale spot, usually smaller in the female than in the male. In the latter the spot extends frequently to the anterior margin, so that discally an approximately rectangular bare area is formed. Elytra irregularly striate-punctate, with three suturally interrupted transverse greenish golden scale bands confluent with a broad lateral marginal stripe. The band at apical third confluent with a subsutural stripe extending to apex. These transverse markings, particularly in the females, indicate that they are derived from laterally confluent spots; in the males the markings are usually broader and less disconnected. Apical slope with a subsutural row of fine setæ. Legs and underside sparsely beset with fine whitish hair.

Male, length, 8.7 to 9.5 millimeters (without rostrum); width, 3.8 to 4. Female, length, 9.5 to 10.4 millimeters (without rostrum); width, 4.4 to 4.6.

MINDORO, Mount Calavite (*Schultze*); Mount Halcon (*Ramos*).

The punctures on prothorax in this species are much coarser and more irregular than in *M. gibbirostris*.

Metapocyrtus (Metapocyrtus) rugicollis Chevrolat. Plate 5, fig. 5, ♂, fig. 6, ♀ (lateral view).

Apocyrtus rugicollis CHEVROLAT, Le Natur. 3 (1881) 439.

Metapocyrtus (*Metapocyrtus*) *rugicollis* Chevrolat, HELLER, Philip. Journ. Sci. § D 7 (1912) 355, pl. 1, figs. 7, 7*a*.

Black, with metallic greenish golden scale markings, legs reddish to dark brown. Rostrum densely and confusedly punctured; basal half with an oblong depression and an irregular scale spot, in the female with a humplike swelling at base, similar as in *M. elegans* Waterhouse but less pronounced. The transverse basal groove confluent with a depression at lateral margin before eyes. Front scatteredly punctured with a fine medial groove and an irregular scale spot. Prothorax broader than long, sides strongly rounded, very coarsely, irregularly, confluently and subrugosely punctured. A scale band at anterior margin confluent with an irregular scale patch at each lateral margin near base toward each side; dorsolaterally a large irregular transverse scale spot which is more or less confluent with lateral marginal patch. Elytra coarsely and irregularly striate-punctate, with three suturally interrupted irregular transverse bands which are mostly confluent along margin. The band at apical third usually confluent with a spot near apex, in the male apical third sometimes entirely beset with scales so that only a small bare subsutural stripe is present. Apex of elytra in the female with a broad but short curved excision.

Male, length, 9.2 to 11.3 millimeters (without rostrum); width, 4.2 to 5. Female, length, 10.5 to 11.4 millimeters (without rostrum); width, 4.9 to 5.1.

LUZON, Tayabas Province, Atimonan: Laguna Province, Lilio, Mount Banahao (*Schultze*).

Metapocyrtus (Metapocyrtus) waltoni Boheman.

Pachyrrhynchus waltoni Boheman, SCHOENHERR, Gen. Curc. 8^2 (1845) 392; HELLER, Philip. Journ. Sci. § D 7 (1912) 311.

Since this species is known to me only from the original description, I prefer to give the same herewith; from the description it is certain that this species is not a *Pachyrrhynchus*, on account of the densely rugosely punctate prothorax. It probably is allied to *M. erichsoni* Chevrolat and *M. rugicollis* Chevrolat.

P. Waltoni. (Schh.)—Oblongo-ovatus, ater, subnitidus; fronte rostroque basi medio viridi-argenteo-squamosis, rostro basi striga transversa insculpto, leviter impresso; thorace amplo, mediocriter crebre rugoso-punctato, lateribus valde rotundato-ampliato, macula utrinque dorsali margine apicali, et subtus viridi-argenteo-squamoso; elytris mediocriter striato-punctatis, arcu basali, margine, fascia media interius interrupta, altera pone medium maculaque apicali viridi-argenteo-squamosis.

Var. $\beta\triangle$. Maculis dorsalibus thoracis majoribus, transversis, elytrorum fasciis abbreviatis, vitta suturali a medio usque ad apicem continuata, viridi-argenteo-squamosis.

Patria: Insulae Philippines. Dom. Walton. Mus. Schh.

Praecedentibus minor, praesertim angustior; thorace amplo, utrinque valde rotundato-ampliato, supra confertim mediocriter rugoso-punctato, ab illis mox distinctus. Caput rotundatum, supra convexum, obsoletissime punctulatum, atrum, sub-nitidum; fronte tenuiter canaliculata, squamulis viridi-argenteis adspersa; oculi rotundati, modice prominuli, nigri; rostrum capite vix longius sed nonnihil angustius, crassum, parum arcuatum, sat crebre evidenter punctulatum, medio longitudinaliter leviter impressum, atrum, subnitidum, subtus parce setulosum. Antennae sub-tenues, nigro-piceae, parce pilosae; clava parva, oblonga, acuminata, fusco-pubescente. Thorax amplus, latitudine media brevior, apice oblique truncatus, antice posticeque angustatus, lateribus ante medium valde rotundato-ampliatis; postice sub-truncatus, tenue reflexo-marginatus, supra convexus, mediocriter confertim rugoso-punctatus, ater, sub-nitidus, margine apicali subtus et macula parva utrinque dorsali, viridi-argenteo-squamosis. Scutellum nullum. Elytra antice truncata, tenue reflexo-marginata, thoracis basi parum latiora, pone basin ad medium modice rotundato-ampliata, dein apicem versus attenuata, apice ipso conjunctim acute rotundata, thorace dimidio longiora, supra convexa, fornicata, mediocriter sat crebre punctato-striata, interstitiis subplanis, laevibus; atra, sub-nitida, arcu basali, fascia media interius interrupta alteraque pone medium latiori, omnibus ad marginem lateralem connexis, maculaque rotunda, apicali, viridi-argenteo-squamosis. Corpus subtus obsolete punctulatum, atrum, parum nitidum, immaculatum. Pedes elongati, atri, nitidi, femoribus modice clavatis, muticis; tibiis sub-compressis, anticis apicem versus inflexis, intus obsolete denticulatis; tarsis dilatatis, subtus brunneo-spongiosis.—Bhn.

Metapocyrtus (Metapoycrtus) difficilis Heller. Plate 5, fig. 23, ♂, fig. 24, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *difficilis* HELLER, Philip. Journ. Sci. § D 7 (1912) 354, 368.

Black, with pale green scale markings. Rostrum densely punctured, in the male dorsally depressed, in the female slightly convex, with an oblong medial depression which is nearly obsolete in the latter. Basal transverse groove more strongly pronounced in the female. Front sparsely scatteredly punctured, with a medial groove. Prothorax slightly broader than long, subspherical, coarsely vermiform-rugose, which sculpture becomes gradually indistinct near base and glabrous at lateral margins; male with an indistinct medial groove. Scattered scales forming indistinctly defined markings as follows: An indistinct anterior marginal band, an ill-defined scale patch at lateral margins, and another patch dorsolaterally. Elytra subovate, in the male as broad as prothorax, in the female broader than prothorax, rather uniformly striate-punctate, with three transverse rows of very irregular scale spots or patches and an irregularly interrupted stripe at lateral margins. Each elytron with two patches at base, two in the middle and two at apical third, the latter having a tendency, particularly in the female, to form a transverse band. Female at beginning of apical sutural decline with a small bifid hump beset with whitish setæ, each elytron terminating at apex in a short conical projection; male at apex uniformly rounded. Legs finely and sparsely whitish setose.

Male, length, 9.6 to 10.2 millimeters (without rostrum); width, 4 to 4.2. Female, length, 9.5 to 11 millimeters (without rostrum); width, 4 to 4.8.

LUZON, Tayabas Province, Atimonan (*W. Micholitz*); Camarines Norte Province, Paracale (*Schultze*).

Metapocyrtus (Metapocyrtus) elegans Waterhouse. Plate 5, fig. 1, ♂, fig. 2, ♀ (lateral view).

Apocyrtus elegans WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 306.

Metapocyrtus (*Metapocyrtus*) *elegans* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 355.

Black, with bluish green metallic scale markings. General aspect and disposition of the markings similar to *M. erichsoni* Chevrolat. Rostrum dorsally rather finely and confusedly punctured with a shallow concavity, the dorsolateral edges in the male toward base slightly swollen. In the female rostrum dorsally with a not very prominent but broad hump before basal transverse groove, sides with a large triangular depression. Sides of head below eye with a scale spot. Front scatteredly punctured, with a medial groove and some scattered scales. Prothorax broader than long, sides slightly rounded, coarsely and confluently granulate with an indistinct medial groove. At anterior margin a scale band confluent with a patch at each lateral margin, near base toward each side dorsolaterally an irregular scale patch. Elytra subovate, irregularly striatepunctate. At base of each elytron two roundish spots of moderate size, one near suture, the other more or less confluent with a marginal stripe; in the middle three spots, arranged in a transverse row, the two outermost confluent and joining the marginal band; at apical third three spots, also more or less confluent, and near apex subsuturally an oblong scale spot. Apical decline of elytra rather uniformly rounded in both sexes.

Male, length, 9 to 10.5 millimeters (without rostrum); width, 3.5 to 4.3. Female, length, 10.5 to 11.8 millimeters (without rostrum); width, 4.5 to 5.6.

LUZON, Laguna Province, Mount Banahao, Paete, Santa Maria, Lilio; Rizal Province, Montalban (*Schultze*), Mount Lumutan (*M. Ramos*).

From the British Museum I received a specimen of this species which was compared with the type; it agrees absolutely with specimens from the above localities.

Metapocyrtus (Metapocyrtus) elegans subsp. **phenax** Heller. Plate 5, fig. 11, ♂, fig. 12, ♀ (lateral view).

Metapocyrtus phenax HELLER, Deutsche Ent. Zeitschr. (1916) 287.

Markings more pale greenish metallic than in the species. Rostrum with the punctures slightly coarser and the basal humplike swelling in the female more strongly pronounced than in the typical *M. elegans* Waterhouse. Prothorax coarsely and more regularly granulate, the dorsolateral scale patch of the former, in subsp. *phenax,* confluent with the lateral marginal patch, forming a broad, irregular, dorsally interrupted transverse band near base, usually more pronounced in the male. Elytra more coarsely and more irregularly striate-punctate, with the scale markings forming three more or less interrupted transverse bands similar as in *M. erichsoni* Chevrolat, the latter of which are confluent along margin and the band at apical third confluent with a longitudinal dorsolateral stripe which extends to apex. In typical *M. elegans* this stripe is represented by two, mostly well-separated spots. Penis structure, Plate 12, fig. 4.

Male, length, 10.5 to 11 millimeters (without rostrum); width, 4.5 to 4.8. Female, length, 10.3 to 12 millimeters (without rostrum); width, 5 to 5.8.

LUZON, Tayabas Province, Malinao (*Baker*). POLILLO (*McGregor; Schultze*).

I examined the type of *M. phenax* Heller and find that it is a pronouncedly localized form of *M. elegans* showing rather constant but relatively slight differences in sculpture and markings, as given above.

Metapocyrtus (Metapocyrtus) picipennis Waterhouse. Plate 5, fig. 9, ♂, fig. 10, ♀ (lateral view).

Apocyrtus picipennis WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 307.

Metapocyrtus picipennis Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 354, pl. 1, fig. 10.

Black, with bluish or greenish scale markings, legs reddish brown except apical part of femora and tarsi which are black. Rostrum densely and confluently punctured with a strongly pronounced medial groovelike depression, and a transverse groove at base. Underside of rostrum with a more or less pronounced conical protuberance. Front scatteredly punctured with a sharply defined medial groove and some scattered scales. Prothorax subglobular, broader than long, coarsely rugose. A narrow scale band along anterior margin, another irregular narrow transverse band in the middle, the latter discally mostly interrupted, both bands confluent with a scale patch at each lateral margin, and some scattered scales along posterior margin. Elytra short subovate, the basal marginal edges rather strongly swollen, coarsely and irregularly striate-punctate, with three irregular narrow transverse scale bands, at base, in the middle, and at apical third. Near apex an ill-defined elongate spot and some scattered scales along lateral margin. Apical decline of elytra abruptly rounded. The elytra in not fully hardened specimens sometimes reddish brown. Penis structure, Plate 12, fig. 3.

Male, length, 9 to 11 millimeters (without rostrum); width, 3.6 to 4.8. Female, length, 8.8 to 11.8 millimeters (without rostrum); width, 4 to 5.8.

LUZON, Cagayan Province, Pamplona (*C. R. Jones*).

A male specimen of this species, which was compared with the type by Mr. Arrow, possesses the conical projection on underside of rostrum. This character is not mentioned in Waterhouse's original description. I examined in this respect 42 specimens (25 males and 17 females), all from the above locality, and found that 18 (9 males and 9 females) have the conical protuberance, whereas in 24 specimens it is wanting or only indicated in a very slight or rudimentary degree. The specimens without this character show no variation from the others otherwise, either in the markings or in the sculpture. *Metapocyrtus picipennis* bears a strong resemblance to *M. rugicollis* Chevrolat in its markings, but in the latter species the transverse bands are much broader.

Metapocyrtus (Metapocyrtus) subfasciatus Waterhouse. Plate 5, fig. 15, ♂, fig. 16, ♀ (lateral view).

Apocyrtus subfasciatus WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 309.

Metapocyrtus subfasciatus Waterhouse, HELLER, Philip. Journn. Sci. § D 7 (1912) 356.

Black, with pale greenish golden scale markings. Rostrum densely punctured with a groovelike depression and an oblong scale spot at basal half, and a transverse basal groove moderately pronounced, in the female rostrum dorsally toward base moderately swollen. Front sparsely and scatteredly punctured with a fine medial groove and an irregular scale spot. Prothorax broader than long, polished off granulate, in the female the sculpture more pronounced than in the male. At interior margin a narrow scale band confluent with a patch at each lateral margin; an oblong medial spot in basal half; and toward each side dorsolaterally near base an irregular scale spot. Elytra irregularly striate-punctate with three transverse rows of irregular spots which are rarely confluent laterally so as to form irregular bands, at lateral margin an irregular stripe more or less confluent with the latter, at apical decline a subsutural stripe extending to near apex. Apical decline of elytra in the male uniformly sloping, in the female more abrupt, forming at apex a slight obtuse projection.

Male, length, 9 to 10.2 millimeters (without rostrum); width, 3.8 to 4.2. Female, length, 9.8 to 10.5 millimeters (without rostrum); width, 4.6 to 5.

LEYTE, mountains near Cabalian (*G. Lopez*).

A large number of specimens of this species from the above locality agree absolutely with a Cuming specimen from the British Museum, kindly compared with the type by Mr. Arrow.

Metapocyrtus (Metapocyrtus) subfasciatus subsp. biliranensis subsp. nov. Plate 5, fig. 21, ♂, fig. 22, ♀ (lateral view).

In general aspect and markings very similar to *M. subfasciatus* Waterhouse, but the scale spots on elytra smaller and less confluent than in that species. The sculpture on prothorax more pronounced, granulate, the punctures on elytra coarser.

Male, length, 9 millimeters (without rostrum); width, 3.8. Female, length, 9 to 10.6 millimeters (without rostrum); width, 4.2 to 5.

BILIRAN, between Leyte and Samar, June 22, 1914 (*McGregor*).

Metapocyrtus (Metapocyrtus) subfasciatus var. catarmanensis var. nov. Plate 5, fig. 20, ♀ (lateral view).

Prothorax finer and more acutely granulate than in *M. subfasciatus biliranensis*, the medial spot at base broad, dorsolateral spots confluent with the scale patches at lateral margins. Elytra with two transverse bands, at base and middle interrupted at suture and a large triangular scale patch at apical third, the latter connected by the marginal stripe with basal band.

Female, length, 8.8 millimeters (without rostrum); width, 4.

SAMAR, Catarman (*R. L. Frost*).

Metapocyrtus (Metapocyrtus) subfasciatus subsp. **variabilis** subsp. nov. Plate 11, fig. 18, ♂, fig. 19, ♀ (lateral view).

Black, with light blue, pale greenish white, or pale greenish bronze scale markings, or entirely black. The markings usually smaller and less sharply defined than in the typical form. Prothorax in the male very coarsely and more regularly flattish granulate; in the female an oblong discal area with the granulation almost obsolete. Elytra in both sexes slenderer, in the female apically more prolonged.

Male, length, 9 to 11 millimeters (without rostrum); width, 4 to 4.8. Female, length, 10.6 to 11 millimeters (without rostrum); width, 4.8 to 4.9.

SAMAR, Wright (*McGregor*).

Metapocyrtus subfasciatus Waterhouse and the above-described subspecies superficially closely resemble *M. erichsoni* Chevrolat, *M. gibbirostris* Waterhouse, and other related species. But *erichsoni, gibbirostris,* and *elegans* and its allies can be distinguished readily by the absence of the scale spot in the middle of the prothorax as well as by the very different sculpture of the latter.

Metapocyrtus (Metapocyrtus) visayaensis sp. nov. Plate 5, fig. 27, ♂, fig. 28, ♀ (lateral view).

Black, with very pale greenish white scale markings. Most nearly related to *M. subfasciatus* Waterhouse subsp. *biliranensis* subsp. nov., with the scale markings very similar to those of the latter except that the medial spot in basal half of prothorax is wanting. Rostrum irregularly punctured with a medial groovelike depression, in the female near base very slightly or almost imperceptibly swollen, basal transverse groove moderately deep, lateral margin in front of eye with an elongate triangular depression. Front sparsely shallowly punctured with a fine medial groove. Prothorax broader than long, flattish granulate, the granulation larger and more irregular than in the above-mentioned species, in the female with a medial groove and an oblong, nearly smooth discal area; a narrow scale band at anterior margin confluent with a scale patch at each lateral margin, in the middle dorsolaterally a small irregular scale spot. Elytra very similar in general form and markings to *M. subfasciatus* but slenderer and more coarsely irregularly striate-punctate; apical region sparsely beset with some rather long whitish hair.

Male, length, 8.3 to 9 millimeters (without rostrum); width, 3.5 to 4. Female, length, 9 to 10.9 millimeters (without rostrum); width, 4.2 to 4.8.

PANAY, Capiz Province, Calivo (*Schultze*); Antique Province, Culasi (*McGregor*).

Metapocyrtus (Metapocyrtus) pseudoelegans Heller.

Metapocyrtus pseudoelegans HELLER, Philip. Journ. Sci. 19 (1921) 548, ♂.

This species is known to me only from the original description which I prefer to give herewith:

> Aterrimus, fronte, prothorace margine antico, in parte mediana et utrinque vitta, laterali, elytris maculis similiter ut in M. eleganti Waterh. dispositis, margine laterali haud, argenteo-viridi-squamosis; rostro latitudine distincte longiore, sat fortiter denseque punctato, basi haud transverso-tumido, dorso sulco mediano manifesto, utrinque carinula antrorsum divergente; fronte oblonga, medio sulcata, utrinque carinula supraorbitali determinata; prothorace globoso, latitudine distincte longiore, sat remote ac distincte punctato; elytris oblongo-ellipticis, subseriato-punctatis, utrinque basi et ante medium maculis duabus rotundatis, post medium tribus, ad apicem una, corpore subter prosterno margine antico vittaque supracoxali, metasterno, ut sternito primo, lateribus, femoribus posticis (in mare elytris superantibus) dorso perparce, argenteo-viridi-squamosos; tibiis utrinque minute remoteque granulosis ac parce fusco-pilosis.
>
> Long. 8 mm., lat. 3.
>
> LUZON, Nueva Vizcaya Province, Imugan.
>
> Resembling *M. elegans.* Waterh., but slenderer, and differing from it by the longer and stronger rostrum, not transversely swollen at base; the oblong, slightly concave front; the non-granulate but distinctly punctate, oblong globular thorax, the sublateral greenish lateral stripe of which extends from base to beyond middle; and the much finer, hardly seriate-punctate and less convex elytra, the lateral margin of which is unscaled except for the oblong greenish spot, forming the extremity of the third transverse row.

Metapocyrtus (Metapocyrtus) picticollis Heller. Plate 3, fig. 20, ♀ (lateral view).

Metapocyrtus (Metapocyrtus) picticollis HELLER, Philip. Journ. Sci. § D 7 (1912) 354, 367.

Black; head, prothorax, and elytra with greenish golden scale markings. Rostrum rather densely and uniformly punctured, a fine whitish hair arising from each puncture, with a broad medial depression at base, less pronounced and indistinct toward apex. Basal transverse groove deep, not interrupting the dorsolateral edges. Front sparsely punctured, a fine hair also arising from the punctures, with a sharply defined medial groove and some scattered scales. Sides of head with a small scale spot below eye. Prothorax slightly broader than long, coarsely and irregularly punctured, with a fine and small whitish hair arising from each puncture and a narrow anterior marginal scale band confluent with an irregular scale patch at each lateral margin; another transverse scale band, also confluent with the latter, at the middle, which curves dorsolaterally backward to the posterior margin. Elytra subovate, coarsely and irregularly striate-punctate, with three suturally interrupted irregular transverse greenish golden scale bands and an irregular lateral marginal stripe. The basal band consists of more or less confluent irregular elongate spots; the second band, before the middle, and the third at apical third are narrow and more or less formed by small spots. Besides the above markings each elytron near apex with a short elongate scale spot in second interstice. Elytra in the female at beginning of apical decline with a small sutural hump beset with whitish setæ and a subsutural row of fine setæ extending from latter to apex. Apical region also with a finer smaller hair arising from punctures. Underside and legs with sparsely scattered whitish setæ. Femora with a few scattered scales near apex; hind femora in the female not reaching to apex of elytra, in the male extending beyond.

Female, length, 11.5 millimeters (without rostrum); width, 4.8.

Philippines; exact locality unknown.

I obtained only one specimen of this species, a female, in exchange from the Dresden Museum. *Metapocyrtus picticollis* Heller is easily recognized by the characteristic scale markings of the prothorax.

Metapocyrtus (Metapocyrtus) abbrevilineatus sp. nov. Plate 1, fig. 13, ♀; Plate 3, fig. 21, ♀ (lateral view); Plate 12, fig. 64, ♀ (head).

Black, with very pale greenish bronze scale markings, the latter forming interrupted and abbreviated lines and stripes. Female rostrum one-half longer than broad, divergent toward apex, dorsally densely punctured, behind the middle with a broad shallow concave depression but basally with a well-pronounced broad humplike swelling. Basal transverse groove deep, beset with a bifid scale spot, front convexly curved, obsoletely punctured, and with a sharply defined medial groove. Sides of head in front of eye strongly depressed and beset with an irregular scale spot. Prothorax broader than long, sides uniformly rounded, very coarsely and irregularly flattish granulate with an indistinct medial groove; along anterior margin a narrow, well-defined scale band confluent at each lateral margin with a longitudinal stripe, the latter again confluent with a narrow band at sides along posterior margin, furthermore dorsolaterally in basal half an abbreviated longitudinal stripe. Elytra subovate, very coarsely and irregularly striate-punctate. Each elytron with three transverse rows of small scale spots which have a tendency to form narrow interrupted bands at base, basal third, and apical third, basal row confluent with a short dorsolateral abbreviated stripe; another longitudinal stripe located more laterally connects basal and second transverse rows of spots; furthermore, a narrow lateral marginal stripe which extends to near apex where it becomes confluent with two abbreviated longitudinal stripes which form a triangular figure at apical third. Underside and legs sparsely beset with fine pale greenish setæ.

Female, length, 12 millimeters (without rostrum); width, 5.1.

LUZON, Sorsogon Province, Sorsogon (*Schultze*).

This species is easily recognizable by the line markings which are somewhat similar as in *Pachyrrhynchus moniliferus* Germar.

Metapocyrtus (Metapocyrtus ?) quadricinctus Chevrolat.

Apocyrtus quadricinctus CHEVROLAT, Le Natur. 3 (1881) 382.

This species by its scale markings seems to be similar in appearance to *M. chevrolati* Waterh., but from its sculptural characters it probably belongs to the subgenus *Metapocyrtus*. Since it is unknown to me, the original description is given here:

> Apocyrtus quadricinctus.—Long 11½ mill. Lat. 5 mill.—A. brevicolli nov. et Chevrolati Waterh. primo affinis structura et secundo dispositione fasciarum; elongatus, biglobosus, niger, nitidus, scapo et pedibus rubris; rostro brevi, nitido supra plano, punctato, antice declive, supra inter antennas late depresso, basi scisso et inter oculos remote sulcato; clava elongata velutina, albida, 5-art.; capite convexo, punctato; prothorace brevi, rotundato, ruge punctato, ad basin reflexo, fascia in margine anteriori et in dorso maculis sparsis laete viridibus; scutello inconspicuo; elytris globosis, apiĉe conjunctim obtuse rotundatiș et breviter bidentatis, sat fortiter punctato-striatis, fasciis tribus margineque et apice laete viridibus, prima basale, secunda in medio et tercia ante apicem; pedibus corallinis, tibiis praesertim anticis et posticis curvatis, intus serie spinosulis, tarsis nigris.
>
> Ins. Philipp. a Dr. Plason missus.

Metapocyrtus (Metapocyrtus ?) chrysogrammus Kuntzen.

Metapocyrtus chrysogrammus KUNTZEN, Deutsche Ent. Zeitschr. (1914) 453.

Black, with pale metallic green or reddish scale markings. Prothorax with a narrow anterior marginal scale band and a lateral marginal scale patch. Elytra with the scale markings forming an indistinct transverse band at base and in the middle and some indistinct longitudinal stripelike markings.

Length, 11.7 millimeters.

LUZON (*Jagor*); Berlin Museum.

It is impossible for me to indicate the relation of this species to others. The only knowledge of it that I have has been gained from Kuntzen's wholly inadequate and incomplete original description, which he based on an imperfect unica specimen; not only is his figure poor, but he fails even to designate the sex of the individual. Unfortunately, my request for more detailed information or for the loan of the specimen remained unanswered. I, therefore, am led to retain this species only because of the hope that in the future the type specimen may be intelligibly redescribed. Were it not for this possibility my inclination would be to consign this specific name to the realm of nonvalidity.

Metapocyrtus (Metapocyrtus) albodecoratus Heller.

Metapocyrtus (Metapocyrtus) albodecoratus HELLER, Philip. Journ. Sci. § D 7 (1912) 354, 365, pl. 1, fig. 9, ♂; pl. 2, fig. 7, ♂.

Dull black; prothorax and elytra with white scale markings. Rostrum densely and coarsely punctured, with a broad and flattish longitudinal medial depression beset with white scales, dorsolateral edges rounded off, male ventrally near apex with a strongly pronounced curved conical projection, female unknown. Front more sparingly and more finely punctured, also with a medial groove which is sparsely beset with white scales. Antenna black, whitish setose, first funicular joint longer than second, the following slightly longer than broad, the last broader than long. Prothorax transverse, densely and coarsely rugosely punctured with a very indistinct medial groove, some white scales along anterior margin and a small spot toward each side behind the middle, dorsolaterally. Elytra short-ovate, dorsally flattish depressed, coarsely and confusedly punctured, but basally near suture and apical part of first interstice striate-punctate, each puncture with a very short white seta. A scale stripe at second interval in basal third which is continued along base and for two-thirds of the length of lateral margin; furthermore, a narrow transverse band in the middle more or less interrupted and four small spots on each elytron at apical third, two of which, located behind each other subsuturally, have a tendency to become confluent. Underside slightly transversely wrinkled, sparsely beset with fine and rather long whitish hair.

Male, length, 11 millimeters; width, 5.5.

Philippine Islands (*Schadenberg*); exact locality unknown.

This species I know only from Heller's original description. The author states concerning this species, "Nach Analogie anderer Arten, dürfte dem ♀ dieser Art die Auszeichnung auf der Rüsselunterseite fehlen." I cannot understand on what precedent this statement is based; in this connection attention is called to *M. picipennis* Waterhouse.

Metapocyrtus (Metapocyrtus) puncticollis Heller.

Metapocyrtus (Metapocyrtus) puncticollis HELLER, Philip. Journ. Sci. § D 7 (1912) 355, 369.

Black, moderately glossy, with pale reddish mother-of-pearl colored transverse scale bands on prothorax and elytra. Rostrum toward base narrowed and coarsely punctured, the medial depression gradually broader anteriorly, the lateral margin with a triangular pitlike depression before eye but not reaching to antennal scrobe. Prothorax transverse, coarsely, discally more sparingly punctured, the interstices particularly toward sides rugose, a scale band at anterior margin, a broad longitudinal stripe at lateral margin and mostly confluent with the latter a transverse spot somewhat behind the middle. Elytra coarsely and irregularly punctured in indistinct double rows, in some specimens the interstices forming indistinct ridges discally. The three transverse scale bands not reaching to suture, the one at base continued along lateral margin to about the middle, the middle band discally slightly curved backward, and the anteapical band more or less connected with an apical spot. Lateral margin between second and third bands also beset with scales. Anal sternite of female with two slight oblong swellings. Legs sparsely beset with rather long whitish hair.

Female, length, 11 millimeters; width, 5.

SIBUYAN (*McGregor*), ex collection Bureau of Science, accession No. 7665.

This species I know only from Heller's original description.

Metapocyrtus (Metapocyrtus) bukidnonensis sp. nov. Plate 5, fig. 30, ♀ (lateral view).

Black, with pale green scale markings; superficially slightly resembling *M. lindabonus* Schultze. Rostrum coarsely and densely confluently punctured, with a deep oblong medial depression, beset with a scale spot, reaching to base, at latter an indistinct transverse groove. Front indistinctly punctured with an irregular patch of scattered scales. Sides of head below eye with an elongate scale spot. Prothorax broader than long, the greatest width before the middle, sides from base toward widest part divergent but rather straight, abruptly rounded at widest part. Prothorax dorsally coarsely and rather uniformly polished off granulate, except a narrow, medial, rugose stripe discally. The granulation extends from anterior to posterior submarginal groove and disappears gradually toward lateral margins. An irregular scale stripe at anterior margin confluent with a large scale patch at each lateral margin, which extends to posterior submarginal groove. Dorsolaterally near base a very large and irregular transverse scale spot. Elytra irregularly striate-punctate, elongate-elliptical, gradually tapering toward apex, forming a triangular projection. At sutural apical decline elytra with a distinct hump, the decline then very steep and abrupt, terminating in the triangular apical projection. Each elytron with the following pale green scale markings: At basal fourth dorsolaterally a large oblong spot; at lateral margin an irregular stripe, expanded spotlike at base, continued to apex, confluent with an irregular broad transverse band at middle, and another in apical third, the latter again confluent with a broad subsutural stripe, leaving only a small bare oblong spot in apical triangle. The transverse bands do not cross suture. Apical sutural decline, beginning with the hump, as well as marginal region near apex, beset with short black setæ. Mesosternum and metasternum with some scattered scales laterally, the whole underside scatteredly setose. Legs black, femora finely grayish setose, tibiæ and tarsi more densely blackish setose.

Female, length, 11.5 to 12.5 millimeters (without rostrum); width, 5 to 5.5.

MINDANAO, Bukidnon Province, Lindaban (*Schultze*).

This species is very characteristic on account of the very peculiarly shaped elytra; five female specimens vary but little. The male of this species probably has the elytra more normally shaped.

Metapocyrtus (Metapocyrtus) lindabonus Schultze. Plate 4, fig. 30, ♂, fig. 31, ♀ (lateral view).

Metapocyrtus (Metapocyrtus) lindabonus SCHULTZE, Philip. Journ. Sci. 21 (1922) 584, pl. 1, fig. 12, ♂.

Glossy black, with pale bluish green scale markings, superficially somewhat resembling *M. ostentator* Heller. Rostrum densely confusedly punctured, in basal half with a medial groovelike depression beset with some scattered scales; an indistinct transverse groove at base. Front sparsely and irregularly punctured, with a sharply defined medial groove and a small irregular scale spot. Prothorax as long as broad, indistinctly scatteredly punctured and rugose, particularly in the female; a fine anterior and more pronounced posterior groove; an irregular anterior marginal stripe confluent with a large scale patch at each lateral margin. Dorsolaterally in basal half a large oblong-oval scale spot. Elytra short-oval in the female, but much more slenderly oblong-oval in the male. Sutural apical decline in the male gradual and uniform, in the female more abrupt. Elytra in both sexes very irregularly striate-punctate in double rows, the punctures rather coarse. Each elytron with three broadish transverse scale bands not reaching to suture, which still show that they are formed of confluent spots. The basal transverse band broad, particularly in the male; the second, located near the middle, slightly narrower and confluent with a marginal stripe; the third, at apical third, more irregular, mostly confluent with a subsutural and also with the marginal stripe, the latter two being confluent at apex, forming a subtriangular apical area which in some specimens has an irregular bare central spot, but in others (males) the whole area is scaled. Apically at suture and along margin some scattered fine white setæ. Mesosternum laterally with a large scale spot. Legs black, femora sparsely and scatteredly whitish setose, tibiæ and tarsi more densely setose.

Male, length, 13 millimeters (without rostrum); width, 5. Female, length, 13.5 millimeters (without rostrum); width, 6.

MINDANAO, Bukidnon Province, Lindaban (*Schultze*).

Metapocyrtus (Metapocyrtus) panayensis Schultze. Plate 4, fig. 8, ♂, fig. 9, ♀ (lateral view).

Metapocyrtus (Artapocyrtus) panayensis SCHULTZE, Philip. Journ. Sci. § D 13 (1918) 373, pl. 1, fig. 4, ♀.

Black; head and prothorax with pale yellowish green scale markings, elytra, with the exception of some bare spots, covered with pink or pale violet scale markings. Rostrum densely and irregularly confluently punctured, with a narrow, elongate, broader groovelike medial depression reaching to front, where it is more sharply defined. The depression of rostrum beset with a pale green scale spot reaching slightly beyond basal transverse groove to front. Prothorax subglobular, slightly broader than long, very coarsely and confluently punctured, with an anterior and a posterior submarginal groove. At the middle dorsolaterally a roundish pale yellowish green scale spot, mostly less than the size of an eye, at lateral margins a large scale patch which is confluent with a narrow anterior marginal band. Elytra oblong-oval, irregularly striate-punctate, the punctures rather coarse, covered with pale violet scales, with the exception of the following bare areas and yellowish markings: Beginning at base and along suture a bare area, slightly expanded spotlike before the middle, from which extends another irregular oblique bandlike bare patch toward lateral margin; at lateral margin two or three other irregular bare spots more or less confluent along margin. The pale violet color of the scales turns gradually into yellowish green at the marginal areas. In the male the bare sutural area is more or less in shape like a +. In some specimens the bare areas show a fine interrupted marginal line of pale yellowish green scales. Underside rugose and finely setose. Femora apically with a broad but more or less interrupted ring spot, finely rugose and sparsely setose.

Male, length, 11 millimeters (without rostrum); width, 4.5. Female, length, 13 millimeters (without rostrum); width, 5.5.

PANAY, Capiz Province, Mount Macosolon (*Schultze*).

This species bears a superficial resemblance to *Pachyrrhynchus jugifer* Waterhouse, with which it was collected from the same plants.

Metapocyrtus (Metapocyrtus) proteus Heller. Plate 1, fig. 8, ♀; Plate 4, fig. 4, ♀, fig. 5, ♂ (lateral view).

Metapocyrtus proteus HELLER, Philip. Journ. Sci. **19** (1921) 547.
Metapocyrtus proteus var. *annuliger* HELLER, Philip. Journ. Sci. **19** (1921) 547.

Glossy black; prothorax and elytra with large scale spots, in some specimens more or less bare in the center, thus appearing as ring spots. Scales either pale green, greenish golden, pale flesh colored, or pale pink, some blue at outer rim of the spots

In form similar to M. *interruptolineatus* Heller. Rostrum densely and confusedly punctured, with an oblong depression in basal half and two indistinct swollen subdorsolateral ridges divergent toward apex. Front with a medial groove and a bifid scale spot. Prothorax subglobular, broader than long, very finely and remotely punctured, with a medial groove abbreviated near base. At anterior margin, toward each side, an irregular scale spot and at posterior margin, also dorsolaterally, another larger oblong spot. Lateral margins with a large scale patch. Elytra finely striate-punctate, with large scale spots forming four transverse rows. Each elytron in first, or basal, row with three spots; the second, or median, row with five spots, the lateral marginal one of which is located more posteriorly; the anteapical row contains three spots; and the apical row, one spot. The spots in the median and anteapical rows seem to have a greater tendency to bareness in the center. Underside and legs black, metasternum with a scale spot laterally, femora with a dorsally interrupted subapical scale band.

Male, length, 11.6 millimeters (without rostrum); width, 5.2. Female, length, 13 millimeters (without rostrum); width, 6.1.

LUZON, Nueva Vizcaya Province, Imugan (*Baker*).

Metapocyrtus (Metapocyrtus) proteus var. annuliger Heller.

Metapocyrtus proteus var. *annuliger* HELLER, Philip. Journ. Sci. 19 (1921) 547.

This variety refers to specimens which have ring markings in place of the spots, concerning which Heller remarks partly as follows:

> * * * there are two apparently very different forms: one ornamented with four scale patches on the thorax and twenty-four on the elytra, the other with as many rings of greenish or bluish scales, arranged on the elytra in four cross rows, a basal one with three, the middle ring of which is situated more caudad, the median four externally oblique, the anteapical with three, the apical with two ring markings on each side, but not distinguished from each other by any plastic character.

Of two specimens in my collection the scale markings in one are pale flesh colored, in the other pale pink. Another specimen which has the pale pink ring markings very strongly pronounced I collected at the following locality:

LUZON, Nueva Vizcaya Province, Santa Fe Road, near Balete Pass (*Schultze*).

Metapocyrtus (Metapocyrtus) congestus Schultze. Plate 1, fig. 12, ♀; Plate 6, fig. 14, ♂, fig. 15, ♀ (lateral view).

Metapocyrtus congestus SCHULTZE, Philip. Journ. Sci. § D 13 (1918) 374, pl. 1, fig. 3.

Glossy black; prothorax and elytra with large oval blue scale spots. Rostrum densely, coarsely, and confluently punctured with a well-pronounced medial depression. A large oblong scale spot on basal half of rostrum reaching to front, the latter with a fine medial groove, finely and scatteredly punctured. Another small spot on sides of head below eye. Prothorax finely and sparsely punctured with a fine anterior submarginal and a more-pronounced posterior submarginal groove. Dorsolaterally a very large oval scale spot, and another still larger one at each lateral margin. Elytra finely striate-punctate. Each elytron with nine large, more or less oval scale spots, which approach each other laterally rather closely. The scale spots form three irregular transverse rows: The basal row has two spots; the medial row, three; the postmedial row, two; and there is a marginal spot between the medial and the postmedial rows and another, more-triangular spot near apex. First and second abdominal sternites subconnate, third to fifth well segmented in both sexes. Hind femora reaching in the female to apex of elytra, in the male well beyond.

Male, length, 11.5 millimeters (without rostrum); width, 4.5. Female, length, 11.5 to 12.5 millimeters (without rostrum); width, 5.2 to 5.6.

LUZON, Benguet Subprovince, Baguio (*O. Schütze*); Mount Santo Tomas (*Schultze; J. S. Wright*).

This species has a remarkable resemblance to small specimens of *Pachyrrhynchus congestus* Pascoe and *P. sanchezi* Heller and was collected in one instance with each of the foregoing species, from the same plants.

Metapocyrtus (Metapocyrtus) tenuipes Heller. Plate 9, fig. 10, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *tenuipes* HELLER, Philip. Journ. Sci. § D 7 (1912) 354, 366.

Black, with small greenish or bluish scale markings, superficially somewhat resembling *M. sparsus* Faust, but slenderer in general form. Rostrum densely and confusedly rugosely punctured with an indistinct shallow medial depression and two indistinct divergent longitudinal ridges. Front slightly concavely depressed with a sharply defined medial groove and beset with an irregular scale spot. Prothorax very slightly broader than long, subglobular, more or less coarsely rugosely and subgranulately punctured, with a distinctly pronounced medial groove; along anterior margin some more or less densely scattered greenish and bluish scales, dorsolaterally a narrow irregular scale stripe which is abbreviated anteriorly, and at lateral margin another broader scale stripe. Elytra oblong subovate, coarsely and slightly irregularly striate-punctate with three irregular transverse rows of three to four scale spots on each elytron and a subapical spot. The spots are roundish or elongate, the elongate ones being a lateral marginal spot near base and one behind middle. Apical region, particularly along suture, with minutely fine short whitish hair.

Female, length, 7.3 millimeters (without rostrum); width, 3.1.

LUZON; without exact locality.

Of this species I have in my collection only one female which I obtained in exchange from the Dresden Museum (No. 6305 leg. *Dr. A. Schadenberg*).

Metapocyrtus (Metapocyrtus) interruptolineatus Heller. Plate 7, fig. 3, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *interruptolineatus* HELLER, Philip. Journ. Sci. § D 7 (1912) 352, 357.

Glossy black; prothorax and elytra with abbreviated pale flesh-colored or whitish scale-stripe markings. In general aspect similar to *Pachyrrhynchus moniliferus* Germar and *P. erosus* Schultze. Rostrum subrugosely punctured, with a short medial depression near base and two subdorsolateral ridges which are divergent toward apex. Laterally before eye a deep longitudinal groove confluent with antennal scrobe. Basal transverse groove strongly pronounced, front scatteredly punctured, with a sharply defined medial groove and an irregular scale spot. Prothorax subglobular, as long as broad, very indistinctly punctured, in both sexes with a fine medial groove. Toward each side dorsolaterally in basal half a fine but more or less interrupted longitudinal scale stripe, some scattered scales laterally along anterior and posterior margins, sometimes also in the middle at lateral margin. Elytra finely and irregularly striate-punctate, at basal and apical third with more or less abbreviated narrow longitudinal stripes of flesh-colored scales, in some specimens a lateral marginal stripe continuous to near apex and there confluent with the abbreviated stripe of second interstice in apical half. In the middle a more or less interrupted narrow transverse band.

Male, length, 10 to 12 millimeters (without rostrum); width, 4.6 to 5.6. Female, length, 10.8 to 13 millimeters (without rostrum); width, 5.4 to 6.2.

LUZON, Benguet Subprovince, Atoc; Mountain Trail at kilometer 88 (*Schultze*).

This species is very variable as to markings. Plate 7, fig. 3, represents a specimen with the markings fully developed, but in most specimens the markings are very much reduced and in some instances entirely absent; the specimens were collected together with *Pachyrrhynchus erosus* Schultze at the same locality. The above-stated facts indicate that *M. pseudomonilifer* Heller and *M. interruptostriatus* Schultze are extremely nearly related to *M. interruptolineatus* Heller and it is probable that when more material of the species involved becomes known they may prove to be only more-specialized local forms of that species, particularly since the sculptural characters are almost alike, differing only in degree of development.

Metapocyrtus (Metapocyrtus) pseudomonilifer Heller. Plate 7, fig. 4, ♂, fig. 5, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *pseudomonilifer* HELLER, Philip. Journ. Sci. § D 7 (1912) 352, 358.

Rostrum, prothorax, and elytra very simliar to *M. interruptolineatus* Heller in form and sculpture, the scale markings pale blue or pale violet. Front with a bifid scale spot. Prothorax toward each side dorsolaterally with an elongate scale spot, some scattered scales along anterior margin and an irregular scale patch at each lateral margin. Elytra irregularly striate-punctate, the punctures slightly more pronounced than in *M. interruptolineatus*. Each elytron at base with four spots, two usually larger, one at second interstice, the other at basal lateral angle; in the middle a transverse row of small irregular spots; two or three spots located at lateral margin and two spots near apex; besides, there are sometimes two or three other spots dorsolaterally at apical third. Femora with a scale spot near apex. Mesosternum, metasternum, and first abdominal sternite in the middle (male), rather densely beset with fine brownish hair.

Male, length, 10.4 millimeters (without rostrum); width, 4.7. Female, length, 11.7 millimeters (without rostrum); width, 5.4.

LUZON, exact locality unknown.

Two specimens of this species I obtained in exchange from the Dresden Museum. The markings in this species are also very variable.

Metapocyrtus (Metapocyrtus) interruptostriatus Schultze. Plate 7, fig. 1, ♂, fig. 2, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *interruptostriatus* SCHULTZE, Philip. Journ. Sci. 21 (1922) 586, pl. 2, fig. 4, ♂.

Glossy black; prothorax and elytra with fine and sharply defined pale green scale lines. Very nearly related to *M. interruptolineatus* Heller and to *M. pseudomonilifer* Heller. Rostrum coarsely and confusedly punctured, strongly divergent toward apex, the dorsolateral edges swollen, a triangular impression in basal half and a medial groove extending to front. Latter scatteredly punctured, beset with a small scale spot which is bifid by the groove. Prothorax as long as broad, subglobular, very finely and scatteredly punctured, with a well-pronounced anterior and posterior submarginal groove and a fine but sharply defined medial groove dorsally in apical half; dorsolaterally toward each side a longitudinal scale stripe usually abbreviated anteriorly, but posteriorly reaching to submarginal groove. Along anterior and posterior margins a more or less interrupted scale line confluent with ill-defined scale markings at lateral margins. Elytra short-ovate, very finely and scatteredly punctate, dorsally with indistinct traces of puncture rows; at apical and basal thirds with abbreviated but sharply defined longitudinal scale lines. Each elytron at basal third usually with three abbreviated lines and a submarginal line extending from base to apex. At base these lines are confluent with a narrow transverse band. In apical third usually two abbreviated lines and traces of rudimentary lines appearing as spots. In some specimens a fine interrupted subsutural line. Most of the scale lines are depressed. Underside, mesosternum, and metasternum with some scattered scales laterally, in the male the mesosternum, metasternum, and first abdominal sternite in the middle transversely wrinkled and densely beset with a patch of fine brownish hair.

Male, length, 12 millimeters (without rostrum); width, 5.3. Female, length, 10.5 to 12.5 millimeters (without rostrum); width, 4.8 to 6.2.

LUZON, Benguet Subprovince, Mount Santo Tomas (*Schultze; Wright*).

The dorsolateral lines on prothorax are wanting in some specimens. The line markings are more sharply defined and narrower than in *M. interruptolineatus.*

Metapocyrtus (Metapocyrtus) perpulcheroides Schultze. Plate 7, fig. 8, ♂, fig. 9, ♀ (lateral view).

Metapocyrtus perpulcheroides SCHULTZE, Philip. Journ. Sci. **23** (1923) 602, pl. 1, fig. 11, ♂.

Black, moderately glossy; prothorax and elytra with metallic coppery or greenish golden scale spots. In general form very similar to *M. interruptolineatus* Heller. Rostrum strongly rugose, separated from front by a deep and well-pronounced transverse groove. In basal half a triangular depression, with an indistinct longitudinal groove, lateral margins of depression forming slightly raised ridges. Front sparsely and scatteredly punctured, with a sharply defined medial groove and a small bifid scale spot. Sides of head below eye also with a small scale spot. Prothorax broader than long, subspherical, finely and scatteredly punctured, prothorax relatively larger in the male than in the female. A well-pronounced anterior submarginal groove and posterior submarginal groove. Dorsally a medial longitudinal groove arising behind anterior submarginal groove and terminating before posterior submarginal groove. Dorsolaterally at anterior margin an irregular scale spot, more or less confluent dorsally in the middle and continued as an irregular marginal stripe laterally. At posterior margin also toward each side a large roundish scale spot and some scattered scales laterally along margin. Sides with another scale spot above anterior coxæ. Elytra short-ovate, very irregularly striate-punctate. Each elytron with three irregular scale spots at base; four or five more or less confluent spots in the middle forming a transverse row; an oblong spot behind the middle at margin; three other spots form a transverse row at apical fourth; and another spot near apex. The spots are uniform metallic coppery or greenish golden. Mesosternum and metasternum laterally with a scale patch. Femora with a scale ring band near apex.

Male, length, 12.5 millimeters (without rostrum); width, 6. Female, length, 11.8 millimeters (without rostrum); width, 6.

LUZON, Kalinga Subprovince, Pinukpuk (*Herre*).

This species is remarkable for its extreme resemblance to *Pachyrrhynchus perpulcher* Waterhouse with which it was collected from the same bushes, presumably as the same species.

The scale markings in this species seem to rub off readily, since a number of specimens appear uniform black, but upon close examination the markings are distinguishable as dull grayish spots.

Metapocyrtus (Metapocyrtus) furcatus Schultze. Plate 10, fig. 11, ♂, fig. 12, ♀ (lateral view).

Metapocyrtus furcatus SCHULTZE, Philip. Journ. Sci. § D 12 (1917) 258, pl. 1, figs. 10, 10*a*, ♀.

Black, with large, very pale greenish bronze scale spots. Rostrum in apical part finely and confusedly punctured, a well-pronounced medial depression expanded toward front and terminating as a flattish depression between eyes. The punctures at the groovelike depression in basal half very coarse and confused, fine whitish hair arising from the punctures. A large scale spot covering entire front. Sides of head also with a large scale patch. Prothorax longer than broad, rather coarsely and irregularly punctured, fine whitish hair arising from the punctures, dorsolaterally a large oblong scale spot, and at each lateral margin a large scale patch confluent at anterior margin with a narrow dorsally interrupted band, the latter usually more distinct in the males. Elytra oblong-ovate, in the female broader than prothorax, in the male very slender, only as broad, apical sutural decline (male) uniformly curved; elytra at apex uniformly rounded; female with a large, roundish, bifid, finely setose and scaled sutural tubercle at beginning of apical decline, the latter abrupt, sutural end of each elytron drawn out in a thornlike projection, the latter divergent, forming a fork-shaped appendix. Each elytron with seven or eight scale spots, more or less confluent, particularly in the male; two oblong-oval spots at base, one dorsal, the other marginal; two smaller spots in the middle; three others at apical third, one elongate and located at the margin; the latter more or less confluent with a triangular spot near apex. Legs black, finely silvery grayish setose; tibiæ below, particularly the anterior, finely and distantly denticulate and densely setose.

Male, length, 8 millimeters (without rostrum); width, 2.5. Female, length, 10 millimeters (without rostrum); width, 3.5.

LUZON, Benguet Subprovince, Baguio, Mount Mirador (*Schultze*).

Metapocyrtus (Metapocyrtus) worcesteri sp. nov. Plate 7, fig. 18, ♀ (lateral view).

Glossy black, with pale golden scale markings. Rostrum irregularly scatteredly punctured, the punctures coarser toward base, a strongly pronounced oval depression beset with a reddish golden spot dorsally at middle, posterior of which basally rostrum is slightly swollen. Basal transverse groove deep and confluent with a deep groovelike depression at sides below the rounded dorsolateral edge of rostrum, the latter depression also confluent with antennal scrobe. Front sparsely scatteredly punctured, with a sharply defined medial groove and some scattered scales. Sides of head below eye with a small scale spot. Prothorax subglobular, slightly broader than long, very coarsely and irregularly punctured, except a small, oblong, nearly impunctate discal area; the punctures confluent and the interspaces coarsely rugose dorsolaterally, at lateral margin the sculpture very pronounced, coarsely granulate. Along anterior margin and between it and the well-defined anterior submarginal groove a pale golden scale band confluent with an irregular broad scale stripe at each lateral margin; dorsolaterally slightly behind the middle a small scale spot. Elytra (female) oblong subovate, apically moderately triangularly prolonged; each elytron forming at apex a very short obtuse point; very coarsely and irregularly striate-punctate. Each elytron with about ten pale golden scale spots as follows: Two at base, one dorsolaterally, the other at humeral angle; three form a transverse row before the middle; three other, larger oblong spots form an irregular transverse row at apical third, and at the middle a lateral marginal stripe, like an elongate spot, extends posteriorly, the latter sometimes confluent with a V-shaped subapical spot. Apical region of elytra beset with very short pale golden setæ. Femora and tibiæ dorsally with elongate dashes of golden scales, also sparsely beset with fine pale setæ.

Female, length, 8.7 to 10.1 millimeters (without rostrum); width, 3.8 to 4.2.

MINDANAO, Zamboanga Province, Zamboanga (*Schultze*).

This remarkable species has a strong mimetic resemblance to *Pachyrrhynchus atrocyaneus* Schultze,[11] with which it was collected. I dedicate it to the memory of the late Dean C. Worcester, formerly Philippine Commissioner and, later, Secretary of the Interior, under whom the Bureau of Science was established. Mr. Worcester was also well known as an ornithologist.

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[11] Philip. Journ. Sci. **24** (1923) 359, pl. 9, fig. 4.

Metapocyrtus (Metapocyrtus) sumptuosus Schultze. Plate 3, fig. 23, ♂, fig. 24, ♀ (lateral view); Plate 12, fig. 38, ♀, fig. 39, ♂ (head).

Metapocyrtus (Metapocyrtus) sumptuosus SCHULTZE, Philip. Journ. Sci. **21** (1922) 585, pl. 1, fig. 4, ♂.

Metapocyrtus (Metapocyrtus) sumptuosus var. *aureatus* SCHULTZE, Philip. Journ. Sci. **21** (1922) 586.

Black, with metallic greenish golden scale markings. Prothorax with a scale band at anterior margin and another transverse band behind the middle; elytra with longitudinal scale stripes which are interrupted before and behind the middle by a transverse bare band. Rostrum densely punctured, slightly convex, an oblong medial depression in basal half beset with a scale spot, and a well-pronounced transverse groove at base. Underside of rostrum with a rather prominent conical projection. Front scatteredly and more coarsely punctured, bearing some scattered scales, a sharply defined medial groove extending nearly to vertex. Prothorax broader than long, very coarsely and confluently punctured, an irregular scale band along anterior margin and a transverse band behind the middle confluent with a scale patch at each lateral margin. Elytra short-ovate, the posterior slope abrupt and steep in both sexes, apex in the male rounded, in the female forming a prominent triangular horizontal projection, the point of which is slightly bent upward. Elytra striate-punctate, in irregular double rows, with longitudinal scale stripes which are interrupted by two transverse bare bands, before and behind the middle, leaving an irregular transverse scale band in the middle, the stripes more or less confluent at base and near apex. Apical projection in the female also black. Apical parts of elytra, particularly along suture and margin, beset with fine hair. Femora and tibiæ reddish brown, except at apex, and tarsi black. Underside black, sparsely and scatteredly setose, mesosternum and metasternum laterally with a scale spot. Male with a dense patch of hair in the middle of metasternum and first abdominal sternite.

Male, length, 11.5 millimeters (without rostrum); width, 5. Female, length, 12 millimeters (without rostrum); width, 5.

LUZON, Ilocos Norte Province, Mount Palimlim (*Schultze*).

Metapocyrtus (Metapocyrtus) sumptuosus var. aureatus Schultze.

Metapocyrtus sumptuosus var. *aureatus* SCHULTZE, Philip. Journ. Sci. 21 (1922) 586.

Prothorax almost entirely beset with scattered scales, except a transverse bare band dorsally before the middle. Elytra without the transverse bare bands, but with rather uniform, alternating golden and black longitudinal stripes.

Locality, same as for the species.

Metapocyrtus sumptuosus is a very characteristic species on account of the ventral projection of the rostrum and the peculiar form and markings of the elytra.

Metapocyrtus (Metapocyrtus) camarinensis sp. nov. Plate 3, fig. 22, ♀ (lateral view); Plate 12, fig. 40, ♀ (head).

Black, with metallic greenish or reddish golden scale markings. In general aspect slightly resembling *M. sumptuosus* Schultze. Rostrum uniformly and densely scatteredly punctured, basal half with a broad but shallow medial groove; at base a very strongly pronounced transverse groove. Front distantly scatteredly punctured, with a sharply defined medial groove. Prothorax as long as broad, the greatest width before the middle, with an anterior and a posterior submarginal groove, and a medial groove extending from the former to near the latter. Dorsal surface densely and coarsely confluently punctured, the sculpture becoming almost obsolete near posterior margin and at sides. Along anterior margin a narrow greenish golden scale band, at each lateral margin in the middle an oblong transverse scale spot. Elytra ovate, the posterior sutural decline rather steep, the suture at the beginning of slope swollen and with a small tuft of hair, also some fine distantly scattered hair near apex. Female with the apical termination of each elytron forming a short thornlike projection. Elytra striate-punctate, in irregular double rows; elytra beset with reddish golden scales forming longitudinal stripes. The stripes dorsolaterally in the middle interrupted by a broad bare transverse bandlike spot, which is convergent at each side, but the seventh to the ninth stripes at lateral margins continuous and not interrupted. Underside and legs black, sparsely and finely whitish setose; underside of tibiæ beset with a few small tubercles and black setæ.

Female, length, 11 millimeters (without rostrum); width, 4.6.

LUZON, Camarines Norte Province, Paracale (*Schultze*).

Metapocyrtus (Metapocyrtus) atocanus Schultze. Plate 9, fig. 11, ♂, fig. 12, ♀ (lateral view).

Metapocyrtus (Metapocyrtus) atocanus SCHULTZE, Philip. Journ. Sci. 21 (1922) 585, pl. 1, fig. 9, ♂.

Black, with metallic green scale markings. Rostrum densely and confluently punctured, with a flattish depression in basal half beset with a scale spot, and a slightly pronounced transverse groove at base. Front confusedly punctured with an indistinct medial groove and a large scale spot. Prothorax broader than long, at lateral margins strongly rounded, dorsally somewhat flattened, coarsely, irregularly, and confluently punctured. A medial stripelike area dorsally, extending from anterior to posterior submarginal groove, has the punctures more obsolete. A scale band at anterior margin confluent with a broad dorsolateral longitudinal stripe, more or less interrupted in the middle, and at each lateral margin with an irregular scale patch. The scale markings circumscribe a bare area at sides, and a larger scaleless area discally. Elytra punctate-striate, in very regular and uniform, shallow, longitudinal grooves, the latter densely beset with green scales forming very regular stripes, which are about equal in width to the glossy black interstices; the scale stripes are confluent at base and at apex. Apical sutural decline of elytra in the male gradually and uniformly sloping, in the female more abrupt and steep. Metasternum with a scale patch laterally; mesosternum, metasternum, and first abdominal sternite in the middle with a dense patch of brownish hair in both sexes, but more strongly pronounced in the male.

Male, length, 8.8 millimeters (without rostrum); width, 3.2. Female, length, 9.8 millimeters (without rostrum); width, 4.

LUZON, Benguet Subprovince, Atoc (*Schultze*).

Metapocyrtus (Metapocyrtus) mandarinus Heller. Plate 9, fig. 23, ♂, fig. 24, ♀ (lateral view).

Metapocyrtus mandarinus HELLER, Deutsche Ent. Zeitschr. (1916) 289.

Black, with pale greenish golden scale stripe markings, in superficial appearance similar to *M. subquadrulifer* Waterhouse. Rostrum scatteredly punctured, with a broad medial depression and an irregular scale spot in basal half, the transverse basal groove indistinct. Front slightly concave in the male, sparsely punctured, with a fine medial groove and mostly with an irregular scale spot. Prothorax subglobular, broader than long, greatest width slightly before the middle, distantly scatteredly punctured, in the female an oblong discal area impunctate. An anterior marginal band confluent with an irregular longitudinal stripe at each lateral margin, dorsolaterally another longitudinal stripe also confluent with anterior marginal band. Elytra subovate, with nine puncture rows. Each elytron with four longitudinal stripes, the first between second and third puncture rows, the second between fourth and fifth, the third between sixth and seventh, and the fourth is a marginal stripe which is confluent near apex with first stripe. The first three stripes are usually more or less interrupted in basal third, the second and third are also interrupted in apical half, or only present as fragments. The stripes are confluent with a basal band; another transverse band at the middle, more or less interrupted and not reaching to suture. Apical region with scattered, but rather long and fine whitish hair. Metasternum and first abdominal sternite of the male in the middle with a dense patch of pale brownish hair, in the female much less pronounced. Hind femora in the male only reaching beyond apex of elytra.

Male, length, 9 millimeters (without rostrum); width, 3.8. Female, length, 9.5 millimeters (without rostrum); width, 4.

LUZON, Benguet Subprovince, Baguio; Mount Santo Tomas (*Schultze*).

Heller's description of this species was evidently based on an imperfect male specimen. The species is to be distinguished from *M. subquadrulifer* by the smaller size.

Metapocyrtus (Metapocyrtus) pseudomandarinus Heller. Plate 4, fig. 18, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *pseudomandarinus* HELLER, Philip. Journ. Sci. 19 (1921) 546.

Dark reddish brown to black, with pale greenish scale stripe markings, the latter very similar to those of *M. mandarinus* Heller. Rostrum densely and confusedly punctured with an indistinct oblong medial depression in basal half, front with a fine medial groove and a large rectangular scale spot. Prothorax very slightly broader than long, coarsely subrugosely punctured with a medial groove. Toward each side dorsolaterally a longitudinal stripe, extending from posterior to anterior margin where it is confluent with a marginal band, this also confluent with an irregular but broader stripe at each lateral margin.

Elytra subovate, coarsely and very irregularly striate-punctate. Each elytron with an abbreviated longitudinal stripe at basal fourth in second interstice, but continued behind middle and extending to near apex, this stripe confluent along base with a marginal stripe, the latter terminating at apical fourth; furthermore, a more or less interrupted narrow transverse band in the middle, usually confluent with the marginal stripes. In apical half another dorsolateral stripe, mostly confluent with the transverse band and branching into the first stripe at about apical fourth.

Male, length, 8 to 8.5 millimeters (without rostrum); width. 3.8 to 4. Female, length, 9.7 millimeters (without rostrum); width, 4.3.

LUZON, Nueva Vizcaya Province, Imugan (*Baker; Mrs. M. and W. Schultze*); Benguet Subprovince, Suyoc (*Zschokke*).

This species is easily distinguishable from *M. mandarinus* and the larger *M. subquadrulifer* by the entirely different sculpture of the prothorax and elytra.

Metapocyrtus (Metapocyrtus) chlamydatus sp. nov. Plate 3, fig. 10, ♀ (lateral view).

Black and glossy, with brilliant metallic reddish or purplish coppery scale markings and ivory white scale spots. Rostrum one and one-half times as long as broad, in apical half rather finely and scatteredly punctured, the punctures coarser toward base, basal half with an oval medial depression and two indistinct swollen ridges nearly convergent at base, transverse groove strongly pronounced. Lateral margins of rostrum with an oblong groove before eye confluent with scrobe. Dorsally rostrum beset with scattered fine silky hair and brilliant scales, particularly in basal half, at lateral margins the hair longer, below eye a spot of golden metallic scales. Front sparsely and coarsely punctured with a fine medial groove and with scattered reddish golden scales. Prothorax subglobular, as long as broad, irregularly scatteredly punctured, discally a small oblong area impunctate, toward lateral margins the punctures coarser, an anterior marginal band of brilliant reddish coppery scales strongly set off by the deep submarginal groove, and irregularly scattered scales all over prothorax but denser toward lateral margins. At lateral margins an irregular longitudinal patch of ivory white scales. Elytra subelliptical, rather coarsely punctured in irregular double rows, the interstices beset with very brilliant metallic lentil-shaped scales forming irregular oblong patches, these forming irregularly interrupted longitudinal stripes. Besides the metallic scale markings each elytron with seven ivory white scale spots as follows: Two at base; one before the middle at fourth interstice; an elongate spot at lateral margin near the middle; and three at apical third. Apical region with fine setæ arising from the punctures. Each elytron terminating at apex in a short, obtusely pointed projection. Underside finely scatteredly setose, mesosternum and metasternum with an ivory white scale patch laterally, last abdominal sternite very coarsely and confluently punctured. Legs black, finely and sparsely setose, femora in apical half above rather densely beset with scattered reddish golden scales.

Female, length, 11 millimeters (without rostrum); width, 4.7.

MINDANAO, Zamboanga Province, Port Banga (*Schultze*).

This species, on account of the peculiar, brilliant, metallic scale markings and white spots, is the most beautiful species of the whole genus. The white scales forming the spots are roundish and larger than the metallic scales.

Metapocyrtus (Metapocyrtus) interruptus Heller. Plate 7, fig. 22, ♀ (lateral view).

Metapocyrtus interruptus HELLER, Deutsche Ent. Zeitschr. (1916) 285, pl. 3, fig. 3.

Metapocyrtus interruptus var. *reductus* HELLER, Deutsche Ent. Zeitschr. (1916) 286.

Black; prothorax and elytra with pale greenish or pale bluish scale markings. Rostrum rather coarsely and confusedly punctured with an ill-defined elongate medial depression and two, mostly indistinct, slightly divergent longitudinal ridges. Basal transverse groove also ill defined; front irregularly scatteredly punctured with a sharply defined medial groove and mostly beset with some scattered scales. Prothorax subglobular, slightly broader than long, indistinctly ground off granulate, in anterior half discally with a deep medial groove. Along anterior margin an irregular narrow scale band, dorsally interrupted but dorsolaterally expanded spotlike; another larger oblong spot dorsolaterally near base, and at lateral margins an irregular scale patch. Elytra oblong subovate, irregularly striate-punctate, female with the sutural region at base indistinctly swollen and dull rugose, dorsolaterally near base two or three more or less pronounced roundish tubercles, the apical sutural decline with a row of fine pale creamy white hair, similar but much finer and shorter hair arising also from the punctures in apical region. Female elytra at apex with a small triangular gap or excision. The pale greenish or bluish scale markings in fully marked specimens consist of four irregular more or less interrupted longitudinal stripes on each elytron and between these two irregular transverse rows of spots, near the middle and anteapically, and an irregular spot subapically. In certain specimens the markings are interrupted and more or less modified so as to form three irregular transverse rows of elongate spots at base, near the middle, and anteapically. Underside very sparsely beset with fine whitish hair, legs black, moderately whitish setose.

Female, length, 9.5 to 12 millimeters (without rostrum); width, 3.7 to 5.

LUZON, Benguet Subprovince, Baguio; Mount Santo Tomas (*Schultze; Sanchez*).

This species is extremely variable in the scale markings as well as in the sculpture, particularly on the prothorax, which in some specimens is indistinctly subrugosely and confluently punctured. I examined eighteen specimens of this species, all females. The var. *reductus* Heller represents a form in which the markings are almost entirely or totally wanting. Among the above-mentioned material are five which represent this variation, three entirely black. In these specimens the sculpture on the prothorax is much less pronounced.

Metapocyrtus (Metapocyrtus) schicki sp. nov. Plate 11, fig. 1, ♂, fig. 2, ♀ (lateral view).

Black, with more or less distinct blue scale markings, legs piceous. Related and similar in form to *M. interruptus* Heller. Rostrum longer in the male than in the female, confusedly rugosely punctured, particularly toward base, with an elongate medial depression and two indistinct divergent ridges. Basal transverse groove confluent with a deep longitudinal groove at lateral margins below the dorsolateral edges, the latter groove also confluent with antennal scrobe. Front sparsely and irregularly punctured with a medial groove and some scattered blue scales. Prothorax subglobular, as long as broad, more narrowly truncate at anterior margin than at base, dorsally irregularly scatteredly punctured with a basally abbreviated medial groove. The punctures in the female much coarser, discally irregularly confluent and subrugose, the area dorsally near base indistinctly swollen, rugose, and subgranulate. In the male near base numerous fine transverse wrinkles, sides with the punctures almost effaced, except at the area above fore coxæ, the latter coarse and with some scattered or an oblong patch of blue scales. Elytra oblong-ovate, glossy, finely and irregularly striate-punctate, in the female the punctures coarser, the suture basally swollen and rugose, laterally near base two or three small tubercles and at the junction with the lateral basal margin with a more prominent tubercle. Each elytron with nine blue scale spots as follows: Two at base, two form a transverse row before the middle, one elongate lateral marginal spot at the middle, three spots form a cross row at apical third, and one spot near apex. These spots in some specimens are only indicated as traces or are entirely absent. Apical sutural decline of elytra in the male uniformly curved, in the female indistinctly swollen but subapically more abrupt, the apex of elytra slightly prolonged. Arising from the punctures, in apical region, some very minutely fine and short whitish hairs. Legs sparsely whitish setose. Hind femora in the female extending to apex of elytra, in the male well beyond. Last abdominal sternite in the female with a broad concave depression.

Male, length, 9.7 millimeters (without rostrum); width, 3.9. Female, length, 10.6 to 11.7 millimeters (without rostrum); width, 4.3 to 4.9.

LUZON, Nueva Vizcaya Province, mountains near Santa Fe (*A. Schick and Schultze*).

I name this interesting species for my traveling companion Mr. A. Schick, of Concepcion, Chile.

Metapocyrtus (Metapocyrtus) caeruleomaculatus sp. nov. Plate 11, fig. 3, ♂, fig. 4, ♀ (lateral view); Plate 12, fig. 62, ♂, fig. 63, ♀ (head).

Black, with light blue scale spots, related to *M. schicki* sp. nov., but slenderer. Rostrum irregularly confluently punctured, with a strongly pronounced groovelike medial depression. Basal transverse groove confluent with a rectangular depression at lateral margins below the dorsolateral edge of rostrum. Front irregularly rugosely punctured with a sharply defined medial groove and an elongate scale spot. Prothorax subglobular, slightly longer than broad, coarsely, irregularly, confluently, and subrugosely punctured, the punctures rather shallow, with a slight, pronounced, basally abbreviated medial groove. In the middle, toward each side dorsolaterally, an elongate blue scale spot, and at each lateral margin a larger irregular scale patch. Elytra elongate-ovate, irregularly striate-punctate, the punctures coarser than in *M. schicki.* Each elytron with eight blue scale spots, two near base, two others forming a transverse row before the middle, one more or less elongate lateral marginal spot behind the middle, two others forming a transverse row at apical third, and one spot near apex; in the female, besides the spots mentioned, another small bifid sutural spot located on the very slight swelling at apical decline. Elytra in the female dorsolaterally near base with two or three rather strongly pronounced tubercles, and prolongate at apex, terminating in a dorsally flattish, knoblike projection. Legs black, sparsely setose, hind femora in the female not reaching to apex of elytra, in the male much beyond. Underside very sparsely and finely setose. Metasternum and first abdominal sternite with a scale spot laterally, in the female last abdominal sternite in apical half depressed and coarsely rugosely punctured, in the male not depressed, finer, more uniformly punctured, and rather densely beset with long pale brownish hair.

Male, length, 8.6 to 9.5 millimeters (without rostrum); width, 3.2 to 3.3. Female, length, 9.1 to 10.4 millimeters (without rostrum); width, 3.5 to 3.8.

LUZON, Nueva Vizcaya Province, mountains near Santa Fe (*Schultze*).

This species was collected together with *M. schicki,* to which it has a great superficial resemblance. It is remarkable that in many instances very distinctly different species of this genus having the same appearance superficially are found together on the same plants.

Metapocyrtus caeruleomaculatus subsp. **imuganus** subsp. nov.

In general aspect similar to the typical *M. caeruleomaculatus,* the scale spots not blue but very pale light green and usually larger. The sculpture differs slightly from that of the typical form, particularly in the female, the two protuberances between the two basal spots on each elytron being larger and more pronounced.

Male, length, 8.4 to 9.7 millimeters (without rostrum); width, 3 to 3.4. Female, length, 8 to 10 millimeters (without rostrum); width, 3 to 4.

LUZON, Nueva Vizcaya Province, Imugan, October, 1924 (*Duyag*).

Recently my collector obtained at each of the respective localities several perfect fresh specimens of the typical form of this species and subspecies. The forms from the two localities seem to be very constant and show no indication of intermediate varieties.

Metapocyrtus (Metapocyrtus) lumutanus Schultze. Plate 3, fig. 1, ♂, fig. 2, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *lumutanus* SCHULTZE, Philip. Journ. Sci. 23 (1923) 603, pl. 1, fig. 9, ♀.

Glossy black, with small pale golden greenish scale spots. Rostrum divergent toward apex, scatteredly punctured, a medial longitudinal groove and a pronounced oblong triangular depression in basal half, the lateral margins of which form somewhat raised ridges. Rostrum separated by a broad transverse groove from front, this sparsely punctured with a small roundish scale spot. Sides of head with a triangular scale spot below eye. Prothorax as long as broad, in the female dorsally sparsely and scatteredly punctate, in the male almost impunctate. Both sexes with an indistinct anterior and a well-pronounced posterior submarginal groove. A roundish spot dorsolaterally at anterior margin and a triangular spot also dorsolaterally near posterior margin, furthermore a small roundish scale patch in the middle at each lateral margin. Elytra oblong-ovate, finely and irregularly punctate-striate, each elytron with eleven small roundish spots: Two spots near base, one dorsolaterally, the other near anterior lateral angle; three form a transverse row near the middle; six at apical half, one at margin, one near apex, three at dorsolateral slope, and one, a subsutural spot, at apical fourth (in the female this spot is located on a small roundish tubercle which bears a small tuft of short black setæ). Metasternum with a scale patch laterally. Femora with a circumscribing scale band near apex.

Male, length, 9.8 millimeters (without rostrum); width, 4. Female, length, 11.5 millimeters (without rostrum); width, 5.

LUZON, Rizal Province, Mount Lumutan (*my collector*).

This species, *M. similis* Schultze, and *M. annulatus* Schultze, from a superficial aspect are similar to species of the subgenus *Sphenomorphoidea*, on account of the peculiar highly glossy general color.

Metapocyrtus (Metapocyrtus) similis Schultze. Plate 3, fig. 19, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *similis* SCHULTZE, Philip. Journ. Sci. **23** (1923) 603, pl. 1, fig. 1, ♀.

Head black, prothorax glossy greenish bronze, elytra glossy dark purplish brown with small pale greenish scale spots. In general aspect very much resembling *M. lumutanus* Schultze. Rostrum minutely and sparsely punctate toward apex, in basal half with a deep and sharply defined longitudinal medial groove. Rostrum obtuse angled at basal junction with front, on the latter the medial groove continued. Prothorax longer than broad, the greatest width before the middle, impunctate. A distinct anterior submarginal groove beset with a fine narrow scale line. Lateral margins in the middle with a few scales. Elytra very finely and irregularly punctate-striate. Each elytron with twelve small roundish scale spots: Two near base; five form a transverse row in the middle; four form a transverse row at apical third, of which the lateral marginal spot is the largest; and one spot near apex. Metasternum with a scale spot laterally. Legs greenish bronze, with a bluish and purplish sheen.

Female, length, 10 millimeters (without rostrum); width, 4.5.

LUZON, Rizal Province, Mount Lumutan, about 700 meters (*my collector*).

Metapocyrtus (Metapocyrtus) annulatus Schultze. Plate 3, fig. 3, ♂ (lateral view).

Metapocyrtus (*Metapocyrtus*) *annulatus* SCHULTZE, Philip. Journ. Sci. **23** (1923) 604, pl. 1, fig. 4, ♂.

Glossy black, elytra with grayish scale spots. Rostrum slightly divergent toward apex, scatteredly punctured, at base angulately set off from front, basal half with a longitudinal medial groove which is continued on front, the latter also sparsely and scatteredly punctured. Eyes rather prominently bulging. Prothorax slightly longer than broad, with a narrow anterior and posterior submarginal scale stripe and a roundish spot at lateral margins. Elytra subovate, finely and irregularly punctate-striate. Each elytron with fifteen rather strongly impressed roundish scale spots: One spot at base near lateral margin; four forming a transverse row in basal fourth, the marginal spot very small; three forming a transverse row in the middle; four large spots forming a transverse row at apical third; an irregular spot near apex; a small subsutural spot behind the middle; and one at apical fourth. Mesosternum and metasternum with a scale patch laterally. Legs relatively long and slender. Tibiæ on underside rather densely setigerous.

Male, length, 9 millimeters (without rostrum); width, 4.

LUZON, Benguet Subprovince, Mount Pulog (*my collector*).

The scales on the impressed spots are very small and rudimentary in this species. Specimens were collected together with specimens of *Pachyrrhynchus annulatus* Chevrolat.

Metapocyrtus (Metapocyrtus) derasus Boheman. Plate 1, fig. 9, ♂; Plate 7, fig. 25, ♀, fig. 26, ♂ (lateral view).

Apocyrtus derasus Boheman, SCHOENHERR, Gen. Curc. 8^2 (1844) 396.
Metapocyrtus (Metapocyrtus) derasus Boheman, HELLER, Philip. Journ. Sci. § D 7 (1912) 353; Deutsche Ent. Zeitschr. (1916) 289.
Metapocyrtus caesiomaculatus HELLER, Deutsche Ent. Zeitschr. (1916) 288.

Since I know this species mainly from the original description, I prefer to give the same as follows:

6. A. derasus. (Schh.)—Oblongus, ater, parum nitidus, glaber; fronte subremote punctulata, canaliculata, rostro crebrius punctato, medio sulcato; thorace amplo, utrinque valde ampliato, supra confertim granulato; elytris thorace multo angustioribus, vage sat crebre punctulatis.

Patria: Manilla. Dom. Westermann. Mus. Schh.

Apocyrto immerito proximus et illo magnitudine aequalis; thorace utrinque magis rotundato-ampliato, elytris sat crebre vage punctulatis ut et squamulis omnino destitutus, ab illo bene distinctus. Caput mediocre, crassum, supra modice convexum, postice sub-laeve, inter oculos minus crebre punctulatum, tenuiter canaliculatum, atrum, parum nitidum, glabrum; oculi subrotundati, parum prominuli, nigri; rostrum capite nonnihil longius et angustius, crassum, sub-teres, rectum, confertim punctulatum basi linea transversa insculptum, medio distincte sulcatum, colore capitis. Antennae tenues, nigrae, parce pilosae; clava oblonga, acuminata, cinereo-pubescente. Thorax amplus, latitudine media brevior, apice oblique truncatus, intra apicem linea transversa impressus, antice posticeque angustatus, lateribus valde rotundato-ampliatus, postice leviter emarginatus vel sub-truncatus, supra valde convexus, granulis nitidis crebre obsitus; ater, sub-opacus, glaber. Scutellum nullum. Elytra oblongo-ovata, antice truncata, reflexo-marginata, thoracis basi nonnihil angustiora, lateribus parum ampliata, apice angustata et conjunctim acute rotundata, thorace dimidio longiora, supra convexa, postice declivia, vage sat crebre punctata, atra, parum nitida, glabra. Corpus subtus obsolete punctulatum, nigrum, parum nitidum. Pedes elongati, validiusculi, atri, sub-nitidi, breviter parceque albo-pilosi; femoribus valde clavatis, muticis; tibiis sub-teretibus, anterioribus apicem versus inflexis, spinulis nonnullis brevissimis intus armatis; tarsis modice dilatatis, subtus brunneo-spongiosis.—Bhn.

Several specimens (males), which were determined by Heller as this species, agree very well with the original description except that they have blue scale spots on the prothorax and elytra which are not mentioned therein. The specimens differ only very slightly in the sculpture of the prothorax from *M. caesiomaculatus* Heller; in fact, that species is only a slight variation of *M. derasus,* as Heller also suspected. *Metapocyrtus derasus* seems to be extremely variable in the male sex, particularly in the sculpture of the prothorax and in general size. In the male the prothorax is broader than the elytra, pronouncedly subglobular, glossy and more or less strongly subrugosely granulate, with a longitudinal discal medial groove in the anterior half; scattered among the granulations are very fine, short greenish hairs. The markings consist of indistinct scattered scales along anterior margin, mostly confluent with a scattered scale swarm at lateral margin and an irregular scale spot dorsolaterally near base. Prothorax relatively smaller in the female than in the male, not as broad as elytra, in sculpture irregularly subrugosely punctured and mostly without any scale markings or the latter very faintly indicated. Elytra (male) oblong subovate, rounded at apex, irregularly striate-punctate, minutely fine greenish white hair arising from the punctures. The bluish or bluish gray scale markings consist of three more or less pronounced transverse rows of spots and a more elongate subapical spot on each elytron. The basal, as well as the second transverse row before the middle, usually with two spots, and the third row at apical third with three or four spots. Elytra in the female more strongly tapering toward apex, at the latter with a small obtuse-angulate excision, the punctures finer and more irregular. Each elytron dorsolaterally near base with three or four small roundish, glossy tubercles, sutural region at base dull and subrugose; scale markings mostly absent or only indicated as traces. Legs black, moderately densely greenish white setose. Hind femora in the male extending well beyond apex of elytra, in the female hardly reaching it.

Male, length, 7.5 to 12.5 millimeters (without rostrum); width (elytra), 2.9 to 5. Female, length, 9 to 9.2 millimeters (without rostrum); width, 3.7 to 3.9.

LUZON, Benguet Subprovince, Baguio (*Baker; Schultze*); Mount Data (*M. Ramos*).

Metapocyrtus (Metapocyrtus) politissimus Heller. Plate 7, fig. 29, ♂, fig. 30, ♀ (lateral view).

Metapocyrtus (Metapocyrtus) politissimus HELLER, Philip. Journ. Sci. § D 7 (1912) 361, pl. 2, fig. 16.

Glossy black, prothorax, basal half of femora and tibiæ reddish or castaneous brown. Rostrum twice as long as broad, densely and confusedly punctured, with an indistinct groovelike medial depression, the transverse basal groove deep and sharply defined. Front narrow, eyes approaching each other rather closely, the former with a deep medial groove. Antennal scape reaching to anterior margin of prothorax, this subglobular, relatively larger in the male than in the female, with an anterior and posterior submarginal groove. Dorsal surface in the male very finely, scatteredly, and almost obsoletely punctured with a fine medial groove in anterior half; female with the punctures much coarser, the medial groove broader, deeper, and longer. Elytra elongate-ovate, finely and irregularly striate-punctate, the posterior sutural decline in the female differing from that of the male in being more rounded, suture near apex, in the female slightly swollen and beset with short setæ. Apical sutural termination of elytra in the male rounded, in the female forming a small triangular excision. Legs finely and scatteredly grayish setose. Hind femora in the male reaching beyond apex of elytra, in the female reaching about to apex.

Male, length, 7 to 7.8 millimeters (without rostrum); width, 2.3 to 2.8. Female, length, 8 millimeters (without rostrum); width, 3.

LUZON, Benguet Subprovince, Mount Pulog (*H. M. Curran; F. Relay*).

Metapocyrtus (Metapocyrtus) sphaericollis sp. nov. Plate 9, fig. 19, ♂, fig. 20, ♀ (lateral view).

Head with antennæ, prothorax, and legs red to reddish brown, elytra and underside black, without any scales, prothorax and elytra very glossy. Rostrum slender, divergent toward apex, densely and rugosely punctured, with an elongate medial depression in basal half and two indistinct divergent ridges. Basal transverse groove indistinct. Front slightly depressed, sparsely rugosely punctured, with a well-defined medial groove. Prothorax subglobular, in the male relatively much larger than in the female and broader in width than elytra, very glossy and very finely scatteredly punctured with a well-pronounced medial groove abbreviated behind the middle; dorsally near base usually some fine transverse wrinkles. Female prothorax less glossy, slightly narrower in width than elytra, greatest width before the middle, irregularly coarsely but shallowly punctured, the medial groove more strongly pronounced. Elytra oblong-ovate, finely and irregularly striate-punctate, the punctures stronger in the female, apical region sparsely beset with fine and small scattered hair, female with a rugose triangular sutural basal area and sutural region near apex slightly swollen and more densely beset with creamy white setæ. Legs scatteredly setose, hind femora in the female extending slightly, in the male well beyond apex of elytra.

Male, length, 7.2 to 9.8 millimeters (without rostrum); width, prothorax, 2.8 to 4; elytra, 2.7 to 3.6. Female, length, 7.4 to 8.3 millimeters (without rostrum); width of elytra, 3 to 3.3.

LUZON, Benguet Subprovince, Mount Santo Tomas (*Schultze*).

This species is rather variable in size; the female resembles very much *M. politissimus* Heller, to which the present species is closely related. The prothorax of the male of *M. sphaericollis* is relatively much larger than in *politissimus;* the sculpture of rostrum and the punctures of prothorax and elytra of the former also show slight but constant differences from the latter.

Metapocyrtus (Metapocyrtus) scabiosus Heller. Plate 9, fig. 27, ♂, fig. 28, ♀ (lateral view); Plate 12, figs. 45, 46.

Metapocyrtus (*Metapocyrtus*) *scabiosus* HELLER, Philip. Journ. Sci. § D 7 (1912) 352, 360.

Black; antenna, prothorax, and legs reddish or dark castaneous brown; elytra entirely densely or partially covered with pale bronze green scales which are pale ochraceous in old specimens. Rostrum longer than broad, in apical half finely, in basal half coarsely and rugosely punctured and with an indistinct medial groove, basal half also slightly concavely depressed, dorsolaterally rounded, basal transverse groove indistinct. Front also slightly concave with a well-defined medial groove and an irregular scale spot. Prothorax subglobular, polished off granulate, and slightly rugose, with a more or less pronounced medial groove and some scattered scales along anterior margin and at lateral margins. Elytra ovate, dorsally slightly flattish depressed, apical sutural decline in the male abruptly steep, in the female gradually curved; apical region in both sexes beset with scattered pale yellowish suberect hair. Elytra irregularly striate-punctate and more or less densely beset with pale bronze-green scales, these in some specimens covering elytra entirely except at apical region. Underside black, very sparsely beset with fine scattered hair. Legs more strongly setose.

Male, length, 7.8 to 9.5 millimeters (without rostrum); width, 3.2 to 4.1. Female, length, 8.2 to 8.6 millimeters (without rostrum); width, 3.2 to 4.

LUZON, Benguet Subprovince, Pauai (*McGregor*): Mount Pulog (*H. M. Curran*); Mount Pulogloko (*Ramos*); Mount Santo Tomas (*Schultze*).

Metapocyrtus (Metapocyrtus) repandicauda Heller. Plate 10, fig. 25, ♂, fig. 26, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *repandicauda* HELLER, Philip. Journ. Sci. § D 7 (1912) 351, 356, pl. 1, fig. 28, ♂, fig. 28*a*, ♀.

Black; head, prothorax, and elytra rather densely and uniformly beset with brilliant malachite green scales. Rostrum coarsely scatteredly punctured, fine scattered hair arising from the punctures, with a broad medial groove. Front sparsely punctured and with some scattered scales; sides of head more densely beset with scales. Prothorax slightly broader than long, with an anterior and a posterior submarginal groove, sparsely scatteredly punctured, and rather uniformly beset with scattered scales, the latter more condensed at the lateral margins, forming an indistinct elongate patch. Elytra elongate-elliptical, irregularly striate-punctate, densely and uniformly beset with scattered scales, the latter at base and along lateral margins also more condensed, forming an indistinct stripe. Elytra of male normal in form, in the female at the beginning of apical decline with a rather prominent sutural hump beset with fine hair, behind which the sutural decline is abrupt, and apex of elytra prolonged into a triangular thornlike projection, apical region also beset with some scattered fine hair. Underside sparsely beset with fine hair, mesosternum, metasternum, and first abdominal sternite more or less densely beset with scales. Legs rather densely setose, hind femora in the female not reaching to apex of elytra, in the male well beyond.

Male, length, 7 to 7.8 millimeters (without rostrum); width, 2.9 to 3. Female, length, 7 to 7.7 millimeters (without rostrum); width, 3 to 3.1.

LUZON, Benguet Subprovince, Mount Pulog (*H. M. Curran*); Mount Santo Tomas (*Schultze; Baker*).

In not fully hardened specimens of this species prothorax and legs are reddish brown; also, the scales on prothorax and elytra in this species rub off rather easily, and perfect specimens seem to be rare. Heller's type (female, coll. Bur. Science) is an immature specimen, as indicated above. At the last-mentioned locality I collected an *Isopterus* sp. ? which in general appearance is extremely like the above; it can be distinguished by the hind femora having a thorn ventrally near the apex.

Metapocyrtus (Metapocyrtus) lepantoensis sp. nov. Plate 11, fig. 5, ♂, fig. 6, ♀ (lateral view).

Black; prothorax and elytra with a few scattered whitish scales at lateral margins. Related to *M. repandicauda* Heller. Rostrum coarsely rugosely punctured with a groovelike medial depression which is more pronounced in the male than in the female. Front less pronouncedly rugosely punctured. Prothorax broader than long, densely confluently punctured, in the male the punctures coarser, fine whitish hair arising from them and a few scattered white scales at the middle of lateral margin. Elytra elongate-elliptical, normal in form in the male, in the female at the beginning of apical decline with a prominent bifid roundish humplike sutural protuberance sparsely beset with short setæ, the apical sutural decline more gradually concavely curved than in *M. repandicauda,* the elytra apically prolonged, forming a very elongated, obtusely pointed, triangular projection. The sutural protuberance much more strongly pronounced than in *M. repandicauda* and in the latter species not bifid. Elytra in both sexes irregularly striate-punctate, the punctures coarser and deeper in the male, with a minutely fine hair arising from each puncture, the hairs gradually becoming longer toward apical region and longest at lateral margins apically. At lateral margin some more or less densely scattered white scales, which seem to have a tendency to form an irregular marginal stripe. Legs rather densely whitish setose.

Male, length, 7.6 millimeters (without rostrum); width, 2.8. Female, length, 7.6 to 8.2 millimeters (without rostrum); width, 2.8 to 3.

LUZON, Lepanto Subprovince, Suyoc (*Schultze*); Mankayan (*M. Ramos*).

Metapocyrtus (Metapocyrtus) multisquamosus Schultze. Plate 7, fig. 20, ♀ (lateral view).

Metapocyrtus (*Trachycyrtus*) *multisquamosus* SCHULTZE, Philip. Journ. Sci. 15 (1919) 557, pl. 1, fig. 13.

Black, with creamy white scales, rather uniformly scattered on prothorax, but on elytra forming numerous small and irregular spots. Rostrum dorsally sparsely and scatteredly punctured, slightly convex, at base slightly constricted and separated from front by a deep transverse groove, basal half with a well-pronounced medial groove continued to front, the latter with a few scattered punctures and scales. Sides of head below eye with a small patch of scattered scales. Prothorax longer than broad, sides moderately rounded, the greatest width before the middle, irregularly and rugosely obsoletely punctured, and more or less densely beset with scattered scales. Elytra short and stout subovate, in both sexes rounded at apex; in the female very irregularly and coarsely rugosely striate-punctate with numerous irregular scale spots, and at apical decline each elytron with a sutural row of a few rather long whitish hairs; male rather regularly and coarsely punctate-striate, the interstices forming slightly pronounced ridges, the scales more scattered than in the female. Underside and legs very sparsely whitish setose. Hind femora of the female reaching well beyond apex of elytra, in the male reaching for half their length beyond apex of elytra. Penis structure, Plate 12, fig. 21.

Male, length, 8.2 to 9 millimeters (without rostrum) ; width, 3.6 to 3.8. Female, length, 9.5 to 10.6 millimeters (without rostrum) ; width, 4.4 to 5.

SIARGAO, near Mindanao (*Schultze; Boettcher*).

I had placed this rather isolated species in the subgenus *Trachycyrtus*, but it is really an intermediate representative and, on account of the nongranulate prothorax and nontuberculate elytra, it is better placed as indicated.

Metapocyrtus (Metapocyrtus) diffusus sp. nov. Plate 11, fig. 29, ♂, fig. 30, ♀ (lateral view).

Black, with very pale greenish or creamy white scale markings. Related to *M. multisquamosus* Schultze, but slenderer. Rostrum dorsally densely punctured, the punctures toward base coarser and subrugose, in basal half a rather strongly pronounced medial groove, and near each lateral edge an elongate, shallower depression. Front with a fine medial groove and some scattered scales. Prothorax subglobular, coarsely subrugosely punctured, with an indistinct medial groove and beset with scattered scales which have a tendency to form an irregular band at anterior margin and another indistinct transverse band behind middle. Elytra subovate, irregularly subrugosely striate-punctate, the punctures shallow, with numerous small scale spots or dots in indistinct longitudinal rows but more densely congregated at base and in middle, showing a tendency to form two indistinct transverse bands. Apical decline with a subsutural row of short setæ, more pronounced in the female. Legs black, sparsely beset with rather long, suberect, bluish white setæ. Hind femora in the female extending slightly beyond apex of elytra, in the male reaching one-third of their length beyond.

Male, length, 7 to 9 millimeters (without rostrum); width, 2.9 to 3.4. Female, length, 8 to 9 millimeters (without rostrum); width, 3.6 to 3.9.

SAMAR, Wright (*McGregor*).

This species has a certain mimicry resemblance to *M. celestinoi* sp. nov.; from *M. multisquamosus* Schultze it is readily distinguished by the slenderer form and the indistinct transverse bands on prothorax and elytra.

Metapocyrtus (Metapocyrtus) subdiffusus sp. nov. Plate 4, fig. 14, ♂, fig. 15, ♀ (lateral view).

Black; prothorax and elytra with scattered bronzy green scales, legs reddish brown, except tarsi which are black. Related and similar in appearance to *M. diffusus* sp. nov., but much smaller. Rostrum irregularly punctured with a medial groove-like depression and two indistinctly swollen ridges. Prothorax densely and irregularly subgranulately punctured, beset with irregularly scattered scales which are more numerous toward anterior and posterior margins and at sides. Elytra subovate, irregularly subrugosely striate-punctate, the rugose sculpture much coarser and more strongly pronounced than in *M. diffusus*. Scales similarly arranged as in the latter species, but the diffused band in the middle more strongly indicated. Apical decline with a subsutural row of fine, short, greenish golden setæ. Legs very sparsely beset with very short greenish golden setæ.

Male, length, 5.7 to 6.1 millimeters (without rostrum); width, 2.6 to 2.7. Female, length, 6 to 7 millimeters (without rostrum); width, 2.8 to 3.

SAMAR, Wright (*McGregor*).

Metapocyrtus (Metapocyrtus) cylas Heller. Plate 9, fig. 13, ♂, fig. 14, ♀ (lateral view).

Metapocyrtus carinatus SCHULTZE, Philip. Journ. Sci. § D 12 (1917) 257.

Black; rostrum strongly coriaceous rugose with a prominent medial groove reaching to the indistinct obtusangulate basal groove. Front also coriaceous. Sides of rostrum before eyes with a shallow triangular depression. Upper margin of scrobe and dorsolateral margin of rostrum distinctly and sharply carinate. Prothorax as long as broad, coriaceous, more pronounced in the female than in the male, and very finely and scatteredly setaceous. Elytra very elongate elliptical, punctate-striate, the punctures small and indistinct, forming regular rows, the intervals forming moderately swollen ridges. Elytra of the male normally developed, without any scale markings, female at the beginning of posterior slope with a prominent sutural, transversely broad, pubescent tubercle, apex with a conical protuberance forming a short thornlike projection. At lateral margins an interrupted or fragmentary stripe of creamy white scales. Underside sparsely and scatteredly setaceous, mesosternum and metasternum laterally with the setæ short and more scalelike. Legs coriaceous and finely transversely wrinkled, rather densely beset with fine silvery gray hair. Hind femora in the female extending slightly beyond apex of elytra, in the male nearly half their length.

Male, length, 9 millimeters (without rostrum); width, 2.8. Female, length, 10 millimeters (without rostrum); width, 3.5.

LUZON, Benguet Subprovince, Pauai (Haight's place); 2,700 meters (*Schultze*).

Heller's description of this species is based on a single male, the type specimen, which I examined in the Dresden Museum.

Metapocyrtus (Metapocyrtus) rufotibialis Heller. Plate 9, fig. 21, ♂, fig. 22, ♀ (lateral view).

Metapocyrtus rufotibialis HELLER, Philip. Journ. Sci. **19** (1921) 548.

Blackish brown; prothorax and elytra with pale green scale spots. In general form very elongate, similar as in *Exnothapocyrtus cylindricollis* Heller. Rostrum densely rugosely punctured, basal transverse groove obsolete, confluent with the elongate front, the latter distinctly concave with a fine medial groove and a large oblong scale spot. Prothorax longer than broad, sides in basal two-thirds almost parallel, distantly scatteredly punctured, with a medial groove in anterior half, in the female the discal area near base coriaceous. Dorsolaterally a longitudinal scale stripe more or less interrupted at anterior third, lateral margins with another broad scale stripe above fore coxæ. Elytra oblong elliptical, in the male rounded at apex, in the female apically with a subtriangular excision; irregularly striate-punctate, with eleven or twelve elongate scale spots, forming longitudinal and irregular transverse rows. Each elytron with three spots at base, three before the middle, one elongate spot in the middle at margin, three spots at apical third, and one or two subapical spots. Rostrum, sides of head, elytra subapically, underside of body, and legs sparsely beset with fine suberect whitish hair. Femora in basal half only, tibiæ entirely reddish or reddish brown.

Male, length, 9.1 millimeters (without rostrum) ; width, 3. Female, length, 10 millimeters (without rostrum) ; width, 3.6.

LUZON, Benguet Subprovince, Baguio, Mount Mirador (*Schultze*).

Metapocyrtus (Metapocyrtus) elongatus sp. nov. Plate 5, fig. 29, ♂ (lateral view).

Very glossy, uniform black, without any scale markings. On account of the elongate general form a very isolated species, the form even more pronounced than in species such as *M. cylas* Heller and *M. rufotibialis* Heller. Rostrum one and one-half times as long as broad, dorsally irregularly coarsely punctured with a strongly pronounced groovelike medial depression which crosses the basal transverse groove and is continued on front as a more sharply defined groove. Front indistinctly rugosely punctured. Prothorax subcylindrical, longer than broad, sides very slightly rounded, very finely and distantly punctured, and with a sharply defined anterior and posterior submarginal groove. Elytra very elongate ellipsoidal, very finely and distantly striate-punctate. Mesosternum, metasternum, and first abdominal sternite in the middle with a dense patch of rather long pale brownish hair, on the other abdominal sternites the hair less dense and more scattered. Mesosternal and metasternal episternum with a patch of short creamy white scalelike hair. Legs black, moderately densely beset with suberect creamy white setæ, hind femora in the male reaching one-third of their length beyond apex of elytra.

Male, length, 10 millimeters (without rostrum) ; width, 3.4.

NEGROS, Occidental Negros, Fabrica (*Schultze*).

This very interesting species bears a superficial resemblance in general form to some species of the genus *Exnothapocyrtus* Schultze.

Subgenus **Dolichocephalocyrtus** novum

A number of species of *Metapocyrtus* Heller, placed by Heller in the subgenus *Metapocyrtus* s. str., are herewith separated from the latter for easier recognition on the following characters: Medium-sized species, with head and rostrum rather long and slender; in the male rostrum relatively longer than in the female; prothorax in the male relatively larger and more subglobular, elytra rather slender and subovate in both sexes, at the base moderately constricted, the lateral margins slightly rounded; the elytra only slightly broader than the prothorax, but in some instances (in males of a few species) the prothorax equal in width or broader than the elytra; in the males the sutural apical decline of the elytra mostly abruptly and more or less uniformly rounded, in the female the elytra at apex forming a more or less acute triangular projection. I designate *Metapocyrtus dolosus* Heller the typical species of this subgenus.

Metapocyrtus (Dolichocephalocyrtus) dolosus Heller. Plate 8, fig. 9, ♂, fig. 10, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *dolosus* HELLER, Philip. Journ. Sci. § D 7 (1912) 355, 370.

Black, glossy, with metallic greenish golden scale markings. In superficial appearance similar to *M. subfasciatus* Waterhouse and *M. erichsoni* Chevrolat but more elongate. Rostrum in the male relatively longer than in the female, dorsally densely confusedly punctured and subrugose, with an indistinct elongate depression in basal half; female irregularly confluently punctured, finer toward apex, near base before the transverse groove slightly swollen, also with an oblong depression beset with some scattered scales. Sides of rostrum before eyes with an elongate groove, an irregular spot of hairlike scales below eye. Front with a medial groove and a large scale spot. Prothorax broader than long, relatively larger, and sides more evenly rounded in the male than in the female, in the male coarsely but strongly polished off granulate with a medial groove; female densely and regularly granulate with an elongate glabrous spindle-shaped discal area. At anterior margin a narrow scale band confluent with an irregular scale patch at each lateral margin, also confluent with the latter an irregular transverse band at about the middle, dorsally curved so as to approach close to posterior margin, but mostly interrupted in the middle. Elytra subovate; apical sutural decline in the male abruptly rounded, straight near apex, in the female more gradually rounded, forming a short, obtusely pointed, triangular projection at apex; in both sexes irregularly and rather coarsely striate-punctate. Each elytron with a transverse band at base, at the middle, and at apical third, the one at the latter confluent with an irregular subsutural stripe at apical decline, this and the transverse bands more or less confluent with an irregular marginal stripe. Basal band sometimes interrupted so as to form irregular spots. Apical region beset with scattered fine white setæ, particularly along sutural decline.

Male, length, 10.2 to 11.3 millimeters (without rostrum); width, 4.3 to 4.8. Female, length, 10.5 to 10.8 millimeters (without rostrum); width, 4.2 to 4.6.

MINDANAO, Surigao Province, Surigao (*Schultze*).

Metapocyrtus (Dolichocephalocyrtus) subdolosus sp. nov. Plate 8, fig. 27, ♂, fig. 28, ♀ (lateral view).

Black, with diffused greenish golden scale markings, which form three very indistinct transverse bands on elytra. Related to *M. dolosus* Heller, but smaller and differing in general form. Rostrum in both sexes similar to that in the latter species, but in the male densely confluently punctured with a groovelike medial depression; in the female, rostrum toward base slightly swollen, the swelling with two divergent ridges which form a V-shaped figure, between the ridges a moderately pronounced medial depression. Front scatteredly punctured, with a fine medial groove and some scattered scales. Prothorax in the male subglobular, as broad as long, densely and rather regularly flattish granulate with an indistinct medial groove, the granulation finer and more acute than in *M. dolosus.* Prothorax in female much broader than long, sides acutely rounded in the middle, densely granulate, the granulation much finer and denser than in *M. dolosus,* with relatively large oval glabrous discal area. In both sexes some scattered scales along anterior margin and at sides. Elytra subovate, in both sexes more elongate and more densely and irregularly striate-punctate than in the above-mentioned species; particularly in the female, the apical triangular projection more prolonged. Apical decline in the female with a slight sutural hump beset with a few short setæ. Apical region and along lateral margin also with scattered whitish setæ. The scale markings consist of a very indistinct transverse band at base, in the middle, and at apical third. Legs dark brown, very sparsely whitish setose.

Male, length, 8.9 to 9.3 millimeters (without rostrum); width, 3.6 to 3.8. Female, length, 8 to 10 millimeters (without rostrum); width, 3.2 to 4.

MINDANAO, Agusan Province, Butuan (*C. M. Weber; E. D. Merrill; C. F. Baker*).

Metapocyrtus (Dolichocephalocyrtus) trifasciatus sp. nov. Plate 1, fig. 15, ♂; Plate 8, fig. 1, ♂, fig. 2, ♀ (lateral view).

Black, glossy, with pale bluish green scale markings forming an irregular narrow transverse band on prothorax and three on elytra. Related to *M. dolosus* Heller. Rostrum densely and rugosely punctured with an elongate medial depression in basal half. Basal transverse groove deep and confluent with a longitudinal groove at sides below dorsolateral edge. Below eye an elongate patch of pale greenish white hairlike scales. Prothorax as broad as long in the male, broader than long in the female, in the former more subglobular, sides more uniformly rounded and uniformly coarsely polished off granulate with an indistinct medial groove, in the latter sides obtuse angled, the greatest width before the middle, uniformly but acutely granulate, discally in basal half with a large oval smooth area. A narrow scale band at anterior margin and an irregular somewhat curved transverse band slightly behind the middle, the latter confluent with an irregular scale patch at each lateral margin, but discally in the male more or less, in the female always interrupted. Elytra in form similar to *M. dolosus,* in the female the apical triangular projection more pronounced than in that species, also slightly curved downward and at the end with a roundish knob, rather coarsely, irregularly striate-punctate. The markings also similar in arrangement to *M. dolosus,* but the transverse scale bands narrower, pale bluish green and interrupted, composed of small irregular spots. Apical region beset with scattered fine greenish white hair. Male mesosternum and metasternum in the middle beset with a patch of rather dense, long, pale brownish hair. Penis structure, Plate 12, fig. 11.

Male, length, 9.3 to 10.5 millimeters (without rostrum); width, 3.8 to 4.5. Female, length, 9.3 to 11.7 millimeters (without rostrum); width, 4 to 4.8.

SIARGAO (*Schultze*).

Metapocyrtus (Dolichocephalocyrtus) bituberosus Heller. Plate 8, fig. 5, ♂, fig. 6, ♀ (lateral view).

Metapocyrtus (Metapocyrtus) bituberosus HELLER, Philip. Journ. Sci. § D 7 (1912) 356, 372, pl. 1, figs. 8, 8*a*.

Black; densely covered with brilliant greenish golden metallic scales. Rostrum densely and confusedly punctured, in the male with a groovelike medial depression in basal half beset with some scattered scales, the basal transverse groove not strongly pronounced, female near base with a bifid hump or protuberance anteriorly of which a pitlike depression and at lateral margins before eyes another deep and irregular triangular depression, the latter in the male not so broad and more groovelike. Underside of rostrum in the male with a swollen ridge ending in a small obtuse conical projection, in the female more strongly developed, pointing backward. Front confusedly punctured, with a fine medial groove and some scattered scales. Prothorax subglobular, in the male as broad as long, in the female broader than long, irregularly polished off granulate, the granulation much finer in the female, in both sexes with rather dense but irregularly scattered scales. Female with a glabrous elliptical discal area mostly scaleless, similar as in *M. dolosus* Heller. Elytra in form also resembling *M. dolosus,* but apical sutural decline in the male more uniformly rounded, in the female slightly swollen, beset with scattered whitish setæ, the apical triangular projection in the female more strongly pronounced; irregularly striate-punctate and rather densely but irregularly covered with scattered scales; in some specimens the scaleless spaces have a tendency to form an irregular transverse band before and behind the middle. Legs reddish brown to black, sparsely whitish setose.

Male, length, 8 to 10.6 millimeters (without rostrum) ; width, 3.5 to 4.3. Female, length, 10 to 11.5 millimeters (without rostrum) ; width, 4 to 4.9.

MINDANAO, Davao Province, Davao (*Schultze*) ; Dolicaon (*F. Grinnell*).

This species is very variable in certain sculptural characters, and particularly in the scale markings, on which account the following subspecies and variations are to be mentioned:

Metapocyrtus (Dolichocephalocyrtus) bituberosus Heller subsp. **samalensis** subsp. nov. Plate 8, fig. 11, ♂, fig. 12, ♀ (lateral view).

Uniformly black; legs reddish brown. Bifid protuberance on rostrum of female more pronounced; sculpture of prothorax more acutely granulate, punctures on elytra denser and coarser.

SAMAL, in Davao Gulf, Mindanao (*Grinnell*).

Metapocyrtus (Dolichocephalocyrtus) bituberosus Heller var. **davaoensis** var. nov. Plate 8, fig. 7, ♂, fig. 8, ♀ (lateral view).

Prothorax in the male more polished off granulate than in the typical form; scale markings consist of an irregular anterior marginal band confluent with an irregular scale patch at lateral margins and a small patch dorsolaterally. Elytra with three transverse, rather sharply defined, irregular scale bands more or less confluent along lateral margins. Elytra markings very similar to those in *M. dolosus* Heller.

MINDANAO, Davao Province (*Baker; my collector*).

Metapocyrtus (Dolichocephalocyrtus) lineaticollis sp. nov. Plate 8, fig. 3, ♂, fig. 4, ♀ (lateral view); Plate 12, figs. 54, 55.

Black, with pale bronze green scale markings, femora reddish brown, black near apex. Rostrum rather coarsely rugosely punctured, with a medial groovelike depression and two very indistinct longitudinal ridges. Basal transverse groove more strongly pronounced in the female, lateral margins in front of eye with a short but deep oblong depression. Rostrum ventrally with a very prominent, subconical, curved, hook-shaped projection, more strongly developed in the female. Front very irregularly subrugosely punctured with some scattered scales which extend to basal part of rostrum. Prothorax in the male subglobular, relatively larger than in the female, uniformly polished off roundish granulate, female with sides more obtusely angled, the greatest width before the middle, not quite so uniformly and more acutely roundish granulate discally with a smooth elliptical area. Both sexes with a narrow anterior marginal scale band confluent with an irregular elongate patch at each lateral margin, furthermore an irregular longitudinal dorsolateral stripe which is more or less abbreviated anteriorly, and discally a narrow medial scale stripe located in an indistinct groovelike depression. Elytra subelliptical, in the male as broad as prothorax, in the female elytra broader than prothorax, striate-punctate in irregular double rows. Apical decline in the female with an elongate subapical sutural humplike swelling, elytra at apex forming a prominent triangular, obtusely pointed projection. In both sexes a narrow irregular transverse band at base; another, broader, irregular band in the middle, suturally interrupted; and another band at apical third. These bands are confluent along lateral margins, the third furthermore more or less confluent with an irregular subsutural stripe at apical third. Apical region beset with fine and scattered whitish hair. Legs sparsely beset with short whitish setæ; underside more densely beset with fine but longer scattered hair.

Male, length, 11.5 millimeters (without rostrum); width, 4.8. Female, length, 12 millimeters (without rostrum); width, 4.7.

MINDANAO, Lanao Province, Mumungan (*Schultze*).

Some other specimens of this species, from Iligan, which differ slightly in sculpture and more so in the scale markings from the above typical form, I designate—

Metapocyrtus (Dolichocephalocyrtus) lineaticollis var. **simplex** var. nov.

Almost uniformly black, except the discal medial scale line on prothorax and very few traces of scattered scales on elytron. Prothorax in the male much more strongly polished off granulate, in the female the granulation less coarse and not so acute.

MINDANAO, Lanao Province, Iligan (*Schultze*).

Metapocyrtus (Dolichocephalocyrtus) univerrucosus sp. nov. Plate 8, fig. 29, ♂, fig. 30, ♀ (lateral view).

Black, with greenish bronze scales, on prothorax the scales irregularly scattered, discally less dense than at sides; elytra with three irregular transverse bands which are diffused by indistinct longitudinal scale stripes. Related to *M. bituberosus* Heller. Rostrum densely irregularly punctured, the punctures very coarse in the male, and dorsally slightly concave with a shallow medial depression, dorsolaterally uniformly rounded to antennal scrobe. Rostrum in the female shorter, dorsally near basal transverse groove very slightly swollen; underside in both sexes without any conical projection. Prothorax subglobular, in the male relatively much larger than in the female; also relatively larger than in the male of *M. bituberosus;* coarsely subgranulately transversely rugose with a very indistinct medial groove discally in both sexes. Elytra rather short subovate, coarsely and irregularly striate-punctate. Female at beginning of apical decline with a small roundish wartlike sutural protuberance, slightly bifid, and beset with a short tuft of greenish setæ, elytra apically terminating in two very short subconnate blunt and obtuse spines. Elytra in the male normal. Legs black, sparsely pale greenish setose.

Male, length, 8 to 10.5 millimeters (without rostrum); width, 3.7 to 4.6. Female, length, 9.5 to 10 millimeters (without rostrum); width, 4.2 to 4.3.

POLILLO (*Baker; Schultze*).

Metapocyrtus (Dolichocephalocyrtus) mindanaoensis sp. nov. Plate 8, fig. 23, ♂, fig. 24, ♀ (lateral view).

Black, with golden green scale markings; legs also black. Related to *M. lineaticollis* sp. nov. and *M, bituberosus* Heller. Rostrum densely confusedly subrugosely punctured with an indistinct groovelike medial depression, in the female near base very slightly swollen; underside in both sexes with a medium-sized conical projection. Prothorax more similar in form and markings to *M. lineaticollis* but the granulation in the male larger and more flattish; in the female less acute, the discal smooth area not so broad but more oblong, the discal medial scale stripe narrower and less pronounced; lateral margins in both sexes irregularly beset with scattered scales. Elytra irregularly striate-punctate, the punctures denser and much coarser than in *M. lineaticollis*. The markings similar to that species as well as to *M. bituberosus*, but with a tendency to form irregular longitudinal stripes which connect the irregular transverse bands. Female with the sutural humplike swelling at apical decline only faintly indicated, not so pronounced as in either of the species mentioned.

Male, length, 8.8 to 10 millimeters (without rostrum); width, 3.7 to 4.5. Female, length, 10 to 11 millimeters (without rostrum); width, 4.3 to 4.6.

MINDANAO, Cotabato, Saob. TATAYAN. ZAMBOANGA, Zamboanga (*E. H. Taylor*).

Metapocyrtus (Dolichocephalocyrtus) clemensi sp. nov. Plate 8, fig. 21, ♂, fig. 22, ♀ (lateral view).

Black, with light greenish bronze scale markings; legs black. Related to *M. dolosus* Heller and *M. mindanaoensis* sp. nov., the scale markings on prothorax and elytra similar to those in the first but not so brilliant metallic, on prothorax more diffused, the transverse bandlike markings on elytra much broader; the general form of elytra more similar to that of the second species but in the female the apical projection more strongly developed. Rostrum densely and rather coarsely punctured with a deep elongate medial depression, particularly in the female, and the dorsolateral parts in basal half swollen, the dorsolateral edge rounded. At lateral margin in front of eye a short oblique groove. Underside of rostrum without any conical projection. Front slightly depressed, irregularly scatteredly punctured with a sharply defined medial groove and some scattered scales. Prothorax subglobular, slightly broader than long; in the male coarsely flattish granulate, similar to that of *M. dolosus* Heller; with a fine medial groove, along which the granulation becomes obsolete, particularly toward base. A narrow scale band along anterior margin confluent with an irregular patch at each lateral margin, and dorsolaterally at the middle a large irregular scale spot which has a tendency to become confluent with lateral marginal patch. Prothorax in the female more irregularly and less acutely granulate with a narrow oblong finely rugose area discally in basal half. This area more uniformly elongate than in the female of *M. dolosus*. Dorsolaterally, furthermore, an indistinct shallow depression and more or less densely scattered scales forming markings that are more diffused than those in the male. Elytra very irregularly striate-punctate, the punctures coarse in the male, in the female less pronounced, in the latter sex the suture at apical decline distinctly swollen and slightly humped, the elytra forming apically a triangular prolongation which is more acute than in *M. dolosus* and more like that in *M. bituberosus* Heller. In both sexes subsuturally a row of whitish setæ at apical decline, the apical region also beset with scattered whitish hair, which is longer and more numerous in the female. Underside and legs sparsely whitish setose.

Male, length, 8.9 to 10.8 millimeters (without rostrum); width, 3.6 to 4.7. Female, length, 9 to 11.4 millimeters (without rostrum); width, 3.9 to 4.9.

MINDANAO, Davao Province, Mount Apo, about 1,700 meters altitude (*J. Clemens*).

I take pleasure in naming this interesting species in honor of its collector, who during his recent ascent of Mount Apo collected a good series of the above species as well as many other insects of this little-known region.

Metapocyrtus (Dolichocephalocyrtus) ruficollis Waterhouse. Plate 1, fig. 6, ♂; Plate 8, fig. 17, ♂, fig. 18, ♀ (lateral view); Plate 12, fig. 52, ♂, fig. 53, ♀ (head).

Apocyrtus ruficollis WATERHOUSE, Ann. & Mag. Nat. Hist. 9 (1842) 304.

Metapocyrtus (*Trachycyrtus*) *ruficollis* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 375.

Apocyrtus rufipes WATERHOUSE, Ann. & Mag. Nat. Hist. 11 (1843) 248.

Metapocyrtus (*Metapocyrtus*) *rufipes* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 352.

Apocyrtus femoralis CHEVROLAT, Le Natur. 3 (1881) 363.

Apocyrtus graniferus CHEVROLAT, Le Natur. 3 (1881) 439.

Metapocyrtus rufithorax HELLER, Deutsche Ent. Zeitschr. (1916) 284.

Black; prothorax and legs reddish brown. Rostrum in the male much longer than in the female, densely and rugosely punctured, in the male the basal half slightly depressed and with an indistinct medial groovelike depression, basal transverse groove less prominent. Rostrum in the female at base with a prominent, indistinctly bifid hump or tubercle, transverse basal groove strongly pronounced, underside with a slightly pronounced ridge which in the female forms only a short obtuse conical projection. Front confusedly punctured and with a fine medial groove. Prothorax broader than long, in the male relatively larger and strongly subglobular and equal to or slightly broader than elytra; in the female dorsally not so strongly convex, not so broad as elytra; densely and more or less confluently punctured with a rather well-pronounced but abbreviated medial groove in the male, and in the female discally a nearly impunctate, smooth oblong elliptical area, the punctures in the latter sex coarser and toward sides finely granulate. In the male dorsally at submarginal groove some fine transverse wrinkles also, near base the punctures become obsolete and are replaced by very fine transverse wrinkles. At lateral margins mostly a few whitish scattered scales. Elytra black, very irregularly striate-punctate, the basal margin forming an acute edge. Each puncture with a fine whitish hair, the hairs almost obsolete in basal half but rather long in apical half, particularly near margin. Near base dorsally a small patch of scattered white scales, furthermore a few along lateral margins, and at apical third laterally a transverse patch. The scale markings are mostly absent in the males.

Apical sutural decline in the male abrupt, elytra at apex rounded; in the female the decline not so abrupt but more rounded, the elytra forming at apex a triangular projection. Mesosternum and metasternum in the middle (male) densely granulate, laterally in both sexes with patches of whitish hairlike scales, all other parts of underside sparsely beset with fine grayish hair. Last abdominal sternite in the female very coarsely punctured. Legs sparsely whitish setose.

Male, length, 11.6 millimeters (without rostrum); width, 5.2. Female, length, 9.7 to 11.6 millimeters (without rostrum); width, 3.8 to 4.8.

MINDANAO, Cagayan Province, Cagayan (*Baker*); Bukidnon Province, Tangkulan, Lindaban (*Schultze*).

Metapocyrtus rufithorax was described by Heller from female specimens only, since otherwise mention would have been made of the great difference in the rostrum, as well as the difference in form of the body, between the two sexes. For this reason I suspected that *M. rufithorax* Heller might be identical with *rufipes* Waterhouse or *ruficollis* Waterhouse. To ascertain the facts in this respect I forwarded a male and a female specimen of *M. rufithorax* to Mr. Arrow of the British Museum, for comparison with the types of the species in question. As a result he found that *M. rufipes* Waterhouse, male, = *M. rufithorax* Heller, male; and *M. ruficollis* Waterhouse, female, = *M. rufipes* Waterhouse, female, = *M. rufithorax* Heller, female. In using the synonyms *M. graniferus* Chevrolat and *femoralis* Chevrolat I followed Heller.

Metapocyrtus (Dolichocephalocyrtus) pikitensis sp. nov. Plate 8, fig. 13, ♂, fig. 14, ♀ (lateral view).

Black, without any scale markings; femora reddish brown. Nearly related to *M. ruficollis* Waterhouse, but differing from the latter as follows: Rostrum in the male very coarsely rugosely punctured with an oblong triangular medial depression; in the female basally with a slightly pronounced humplike swelling. Prothorax black, in the male polished off granulate, so that the sculpture appears like punctures connected by a network of grooves, and with an indistinct medial groove; in the female densely flattish granulate, with the glabrous discal area smaller than in *M. ruficollis*. Elytra irregularly striate-punctate, in the female apically more prolonged than in *ruficollis*.

Male, length, 9.8 to 10.7 millimeters (without rostrum); width, 4.3 to 4.8. Female, length, 8.9 to 9.4 millimeters (without rostrum); width, 3.6 to 4.1.

MINDANAO, Cotabato Province, Pikit (*Taylor*).

Metapocyrtus (Dolichocephalocyrtus) frosti sp. nov. Plate 1, fig. 10, ♂; Plate 8, fig. 15, ♂, fig. 16, ♀ (lateral view). Plate 12, figs. 56, 57.

Black, with light blue or greenish white scale markings. Rostrum densely punctured, in the male basal half slightly concave with a medial groovelike depression, in the female slightly swollen, the medial depression shorter, the basal transverse groove in the latter deeper and confluent with a short and deep depression at each lateral margin before eyes. Front scatteredly punctured, with a fine medial groove. Prothorax subglobular, as broad as long in the male, but broader than long in the female, in both sexes polished off granulate; in the female the granulation not so uniform and dorsolaterally more acute; at lateral margins this sculpture gradually obsolete, in the female discally an oblong area with the granulation flattish confluent. Along anterior margin some scattered blue scales and at lateral margins a small patch. Elytra irregularly striate-punctate, a narrow irregular band of blue scales at base and another more or less interrupted transverse band slightly before the middle, these markings only faintly indicated in the female and the scales in that sex mostly whitish or very pale greenish. At apical region scattered fine whitish hair arising from the punctures. In the female the elytra form apically a rather broad, in lateral view a triangular projection. Legs black, whitish setose.

Male, length, 8 to 10.7 millimeters (without rostrum); width, 3.2 to 4.2. Female, length, 9.4 to 10.5 millimeters (without rostrum); width, 4 to 4.8.

SAMAR, Catarman (*R. L. Frost*).

This species seems to be confined to Samar.

Metapocyrtus (Dolichocephalocyrtus) elicanoi sp. nov. Plate 9, fig. 17, ♂, fig. 18, ♀ (lateral view).

Black, with very sparsely scattered pinkish white scales on prothorax and elytra. Related and in general form similar to *M. frosti* sp. nov., but readily distinguishable from it as follows. Rostrum in the male with the medial groovelike depression much deeper and more strongly pronounced than in *M. frosti*, the depression at lateral margin less pronounced; female with rostrum basally more strongly swollen, the transverse basal groove much deeper. Prothorax in both sexes with the granulation uniformly acute roundish granulate, fine whitish hair arising between the granulations. Elytra densely and irregularly, more coarsely and subrugosely striate-punctate, a fine hair arising from each puncture, and with very sparsely irregularly scattered scales.

Male, length, 7.8 to 10.3 millimeters (without rostrum); width, 3 to 4.3. Female, length, 8.9 to 10.5 millimeters (without rostrum); width, 4 to 4.7.

BATAN, Liguan, near the southeastern coast of Luzon (Albay Province). LEYTE, Butasan (*Elicaño*).

I take pleasure in naming this very interesting species in honor of its collector, Mr. V. Elicaño, geologist of the Bureau of Science. The specimen from Leyte is absolutely identical with the specimens from Batan Island near southern Luzon, which fact is very noteworthy as an indication of former but more-recent land connections than between other islands in that region. In this connection the following related but distinct species and their localities may be mentioned:

M. frosti, Samar.	*M. ticaoensis,* Ticao.
M. elicanoi, Leyte and Batan.	*M. negrosensis,* Negros.

Metapocyrtus (Dolichocephalocyrtus) negrosensis sp. nov. Plate 8, fig. 19, ♂, fig. 20, ♀ (lateral view).

Black, with very few pale bluish white scales, scattered at lateral margins of elytra. Rostrum confluently and coarsely punctured, finer toward apex, in the male shallowly depressed in basal half and with a groovelike medial depression, in the female broader, the basal transverse groove well pronounced. Front scatteredly punctured, with a fine medial groove. Prothorax subglobular, in the male slightly broader than elytra, very regularly and slightly polished off granulate, in the female the granulation more acute, except an elliptical discal area, with the sculpture irregularly rugose, and a rather strongly pronounced medial groove, this not present in the male. Elytra subovate, very slender, the sides for two-thirds of their length nearly subparallel, irregularly striate-punctate, the punctures coarser and more irregular in the female. A minutely fine white hair arising from each puncture, the hairs becoming longer toward apical region. Elytra of the female forming a broad rounded projection at apex, triangular in lateral view. Underside of male rather densely and long whitish pilose in the middle of mesosternum, metasternum, and first and last abdominal sternites, the last sternite very coarsely punctured; female sparsely pilose, the last abdominal sternite smooth and very glossy, with a bifid hump. Legs black, whitish setose. Hind femora in both sexes reaching beyond apex of elytra.

Male, length, 8 to 9.5 millimeters (without rostrum); width, 3 to 3.6. Female, length, 9.7 millimeters (without rostrum); width, 3.8.

NEGROS, Occidental Negros (*Taylor*).

This species is a very exceptional one, in which the hind femora of the female reach beyond the apex of the elytra.

Metapocyrtus (Dolichocephalocyrtus) ticaoensis sp. nov. Plate 8, fig. 25, ♂, fig. 26, ♀ (lateral view).

Black, with a few scattered pale greenish white scales at lateral margins of elytra. Very nearly related to *M. negrosensis* sp. nov. and differing from the latter in the following characters: Female, rostrum more coarsely and confusedly punctured, the medial depression more strongly developed, basal transverse groove more strongly pronounced. Prothorax with the granulation larger and coarser, in the discal elliptical area the granulation indistinct and laterally confluent, the medial groove not so strongly pronounced. Elytra not so slender, at lateral margins more bulging, very coarsely and irregularly punctate, the punctures dorsally near base more or less confluent, also with a minutely fine hair arising from each puncture. The apical projection larger than in *M. negrosensis*. Hind femora not reaching beyond apex of elytra. Penultimate abdominal sternite with a strong depression in the middle, the last sternite irregularly depressed and glossy.

Female, length, 10.8 millimeters (without rostrum); width, 4.6.

TICAO, between southern Luzon and Masbate (*McGregor*).

Metapocyrtus (Dolichocephalocyrtus) bambalio Heller. Plate 11, fig. 23, ♂, fig. 24, ♀ (lateral view).

Metapocyrtus (*Metapocyrtus*) *bambalio* HELLER, Philip. Journ. Sci. § D 7 (1912) 353, 362, pl. 1, fig. 27, ♂, fig. 27*a*, ♀ (elytra).

Black; prothorax and elytra very sparsely scattered with pale whitish or greenish scales. Rostrum one and one-half times as long as broad, coarsely and densely punctured, the groovelike medial depression rather deep and widening anteriorly, basal transverse groove distinct. In the female, rostrum dorsally before the transverse groove slightly swollen. Front scatteredly punctured with a sharply defined medial groove. Prothorax subglobular, in the male very slightly longer than broad, the greatest width slightly behind the middle, moderately densely punctured, the interspaces irregularly rugose, with a rather well-pronounced medial groove; prothorax in the female broader than long, sides obtuse angulately, glossy granulate, discally with an oblong, rather smooth medial stripe. Elytra oblong elliptical, only slightly broader than prothorax, irregularly striate-punctate and very sparsely beset with scattered scales, the latter denser toward lateral margins with a tendency to form indistinct cloudy transverse bands at middle and apical third. Female elytra at beginning of apical sutural decline somewhat humped, at apex forming an obtuse triangularly pointed projection; apical region beset with fine hair. Legs reddish brown, sparsely beset with short whitish or greenish setæ. Hind femora in the female not reaching apex of elytra, in the male reaching beyond.

Male, length, 8.5 to 11 millimeters (without rostrum); width, 3.7 to 4.6. Female, length, 8.9 to 10 millimeters (without rostrum); width, 3.8 to 4.

LUZON, Benguet Subprovince, Irisan River (*McGregor*).

I have six male specimens of this species before me, one without exact locality labeled *A. bambalio* Dohrn in litt. (ex coll. Mus. Dresden), and four females from the above-mentioned locality.

Metapocyrtus (Dolichocephalocyrtus) chloromaculatus sp. nov. Plate 1, fig. 5, ♀; Plate 3, fig. 27, ♂, fig. 28, ♀ (lateral view).

Black, with very pale green scale spots. Rostrum densely and irregularly punctured, coarser toward base, in basal half with a groovelike medial depression which is broader anteriorly. The well-pronounced basal transverse groove confluent dorsolaterally with an oblong groovelike depression at lateral margins before eye, the latter not confluent with scrobe. Front sparsely punctured, with a fine medial groove. Prothorax subglobular, regularly granulate, the granulation in the male coarser and flattish polished off, in the female more acute, discally with an oblong slightly rugose and sparsely punctured area and a medial groove. A narrow, more or less abbreviated, pale green scale band at anterior margin, an irregular scale patch at each lateral margin, and a roundish scale spot in the middle dorsolaterally. Elytra subelliptical, in the male uniformly rounded at apex, in the female the sutural apical decline more abrupt, the apical part prolonged, forming a rather broad projection, roundish at apex; coarsely and irregularly striate-punctate, the first and second rows irregularly confluent double rows with the punctures very coarse. Each elytron with eight pale greenish white scale spots, forming three irregular transverse rows: Two spots at base; three in the middle, the medial one placed more forward; and three at apical third, the lateral marginal one oblong and located nearer the middle. Between the spots in the last row are sometimes secondary smaller spots. Fine whitish hairs arise from the punctures in apical region. Legs black, sparsely whitish setose, hind femora in the female reaching to apex of elytra, in the male well beyond.

Male, length, 9.8 millimeters (without rostrum); width, 4. Female, length, 9.8 to 10.8 millimeters (without rostrum); width, 4.6 to 5.

PANAY, Capiz Province, Jamindan (*my collector*).

In general form of the elytra this species resembles *M. ticaoensis* sp. nov.

Metapocyrtus (Dolichocephalocyrtus) figuratus Heller. Plate 3, fig. 25, ♂, fig. 26, ♀ (lateral view); Plate 12, fig. 7.

Metapocyrtus (Metapocyrtus) figuratus HELLER, Philip. Journ. Sci. § D 7 (1912) 373, pl. 2, fig. 13.

Black; prothorax and elytra with very pale greenish scale-line markings. Rostrum longer than broad, strongly divergent toward apex, apical half densely and confusedly punctured, basal half more coarsely punctured and with a rather indistinct medial groove, the basal transverse groove very deep. Front scatteredly punctured and with a sharply defined medial groove. Prothorax broader than long, in the male mostly broader than elytra; very coarsely and regularly polished off granulate, with a shallow medial groove beset with a pale greenish scale line, the latter confluent with an anterior marginal line which in turn is confluent with an irregular scale band at each lateral margin, extending to the posterior margin where it is curved upward and dorsolaterally obliquely forward, terminating before anterior margin. Elytra oblong-ovate, apical decline in the male uniform but abruptly curved, in the female the slope more gradual, elongate, forming at apex a triangular projection; basal margin finely ridged, rather coarsely and irregularly striate-punctate. Each elytron with an irregular scale line at base confluent with a lateral marginal stripe which is apically confluent with a subsutural stripe, the latter more or less abbreviated near base, or interrupted; at basal third an irregular transverse scale band, mostly interrupted, at apical third another transverse band, both connecting the marginal and subsutural lines; at sixth interstice another longitudinal line extending from base to third transverse band, also mostly interrupted. Sutural decline and margin near apex beset with a row of fine hair. Underside black, in the male mesosternum, metasternum, and first abdominal sternite in the middle with a patch of rather long and fine brownish hair. Femora in the male reaching well beyond apex of elytra, in the female not reaching to apex.

Male, length, 9 to 11.5 millimeters (without rostrum); width, 4.2 to 5. Female, length, 10.5 millimeters (without rostrum); width, 4.5.

CATANDUANES, Virac (*J. Whitehead; C. Dexter-Allen; Schultze*).

Heller's description of this very striking species is based on a male specimen only.

Metapocyrtus (Dolichocephalocyrtus) emarginaticollis sp. nov. Plate 11, fig. 16, ♂, fig. 17, ♀ (lateral view).

Black, without any scales, femora dark reddish brown to black. Rostrum longer in male than in female, in the former dorsally flattish slightly concavely depressed, densely irregularly punctured, and with a small humplike swelling basally, before the rather indistinct basal transverse groove, the latter continued to lateral margins, forming a small pitlike depression. Upper edge of scrobe distinctly swollen, antennal scape longer in the male than in the female. Rostrum in the latter dorsally uniformly convexly swollen forming at base a more-pronounced hump, the basal groove deeper and the pitlike depression laterally larger and more squarish. Front in both sexes with a few scattered punctures and a fine medial groove. Prothorax subglobular, more strongly so and larger in the male than in the female, in the male much broader, but in the female slightly less in width than elytra. In both sexes prothorax very coarsely and uniformly polished or ground off granulate, the granulation more flattish in the male, with an anterior and a posterior submarginal groove. The anterior marginal bandlike area, set off by the latter, in both sexes lateroventrally abruptly emarginate, the marginal band at the beginning of the emargination forming a distinct sharp pointed angle. Elytra subovate, shorter and stouter in the female, in the latter the greatest width slightly behind the middle, in both sexes coarsely and irregularly striate-punctate. Apical sutural slope of elytra in the male normal, in the female at beginning of apical decline a small indistinctly bifid sutural tubercle beset with a small tuft of a few short setæ, and at apex each elytron with a relatively short but stout and acutely pointed thornlike spine, the two spines curved downward and forming a $\wedge$-shaped gap. Along lateral margin and at apical region fine whitish hair arising from the punctures, the latter more strongly pronounced in the female. Underside and legs sparsely whitish setose. Legs, particularly the anterior, longer in the male than in the female. Anterior tibiæ ventrally with five to six triangular teeth, the anterior ones more strongly developed, and still more so in the male.

Male, length, 12 millimeters (without rostrum); width of prothorax, 5.1, of elytra, 4.8. Female, length, 11 to 11.5 millimeters (without rostrum); width of elytra, 4.8 to 5.1.

SAMAR, Wright (*McGregor*).

This interesting species is easily distinguishable in both sexes by the peculiar form of the rostrum, the abrupt emargination of the prothorax, and in the female by the peculiar apical spines, on account of which this species is somewhat isolated from the other species of this subgenus.

Metapocyrtus (Dolichocephalocyrtus ?) opulentus Chevrolat.

Apocyrtus opulentus CHEVROLAT, Le Natur. 3 (1881) 382.
Metapocyrtus (Metapocyrtus) opulentus Chevrolat, HELLER, Philip. Journ. Sci. § D 7 (1912) 356.

This species, known to me only from the descriptions, seems to belong to the subgenus *Dolichocephalocyrtus*. The original description is given here:

A. opulentus.—Long. 10 mill. Lat. 5 mill.—Elongatus, biglobosus, niger, squamulis aureo splendentibus dense tectus; rostro supra plano, nigro, punctulato, antice declivi longitudine sat profunde sulcato, capite inter antennas aureo etiam sulcato; clava elongata, albida, alcuta [?]; prothorace rotundato, antice posticeque cylindrico, sulcato; elytris ovalibus in sutura breviter acuminatis; pedibus nigris, femoribus clavatis, glabris, tibiis posticis longioribus, tarsis infra spongiosis.

Ins. Philipp. typus auct.

Metapocyrtus (Dolichocephalocyrtus ?) glaberrimus Chevrolat.

Apocyrtus glaberrimus CHEVROLAT, Le Natur. 3 (1881) 382.

This species is known to me only from the original description, which is given here. It seems to belong to the subgenus *Dolichocephalocyrtus*.

A. glaberrimus.—M. Long. 11 mill. Lat. 2 mill. Fem. Long. 14. mill. Lat. 4 mill.—A. Wallacei Pascoe vicinus, sed elytris in apice haud recurvis; elongatus, bis oblongus; glaber, viridi violaceus; rostro apice oblique truncato; supra conice impresso; capite violaceo, punctulato; clava antennali ovata, feminae longiora, albida; prothorace oblongo, lateribus mediis rotundato, glabro indistincto punctulato; antice cylindrice marginato, postice transversim sulcato et reflexo, vitta marginali infra squamulis laete viridibus formata; scutello inconspicuo; elytris oblongis, glabris, apice conjunctim rotundatis, sed in femina longius obtuse productis, singulatim in dorso sexies punctato-striatis, ultra medium interruptis, maris ad basin violaceis, vitta marginali quatuorque maculis squamosis laete viridibus; tibiis posticis longioribus, arcuatis, nigro pilosis. M. et F.

Mindanao, a. D. Lorquin captus.

Subgenus **Trachycyrtus** Heller

Trachycyrtus HELLER, Philip. Journ. Sci. § D 7 (1912) 303, 374.

Some medium-sized, but mostly small species. Prothorax granulate, elytra subrugosely punctured and subtuberculate or subgranulate in sculpture. The typical representative of this subgenus is *M. profanus* Erichson.

Metapocyrtus (Trachycyrtus) profanus Erichson. Plate 7, fig. 16, ♂, fig. 17, ♀ (lateral view).

Apocyrtus profanus ERICHSON, Nov. Act. Leop. Car. 16 (1839) Suppl. 255; GUERIN, Icon. Reg. Anim. Ins. (1846), pl. 37, fig. 6; Rosensch., SCHOENHERR, Gen. Curc. 5 (1839) 825; 8 (1844) 395.

Metapocyrtus (*Trachycyrtus*) *profanus* Erichson, HELLER, Philip. Journ. Sci. § D 7 (1912) 375.

Black; prothorax and elytra with sparsely to moderately densely scattered pale greenish bronze scales. Rostrum densely and coarsely rugosely punctured and beset with fine hair. An indistinct medial depression in basal half and two slightly swollen ridges, basal transverse groove well pronounced and confluent with an irregular pitlike depression at each lateral margin in front of eye, the latter of which is confluent with antennal scrobe. Prothorax subglobular, slightly longer than broad, coarsely glossy, roundish granulate, with sparsely scattered scales between the granulations, the scales more numerous in the male and in both sexes more condensed at lateral margins. Elytra oblong subovate, densely rugosely subgranulate; female with the suture basally distinctly swollen, each elytron at apex obtusely pointed, apical decline with a subsutural double row of fine setæ; apical regions in both sexes with extremely fine short setæ arising from the granulations. Moderately densely scattered greenish bronze scales form an indistinct diffused transverse band at base and in the middle, the latter usually more pronounced in the female. Legs black, beset with scattered whitish setæ.

Male, length, 7.5 to 8 millimeters (without rostrum); width, 3 to 3.3. Female, length, 8.7 to 9.2 millimeters (without rostrum); width, 3.6 to 4.

LUZON, Laguna Province, Los Baños, Paete (*Schultze*).

A local form of this species I designate—

Metapocyrtus (Trachycyrtus) profanus var. **arayatensis** var. nov.

Black, with very sparsely scattered pale greenish white scales; the scale markings extremely faintly indicated. Legs dark reddish brown.

LUZON, Pampanga Province, Mount Arayat, the peculiar isolated mountain arising from the plains of Pampanga Province (*McGregor*).

Metapocyrtus (Trachycyrtus) palawanensis sp. nov. Plate 10, fig. 9, ♂, fig. 10, ♀ (lateral view).

Black; prothorax and elytra with moderately densely irregularly scattered pale greenish bronze scales which, particularly in the female, have a tendency to form an indistinct transverse band on elytra behind the middle. Most closely related to but smaller than *M. profanus* Erichson. Rostrum densely and subgranulately punctured, beset with fine suberect hair and with an indistinct medial depression. Front rugosely punctured, with scattered scales and a fine medial groove. Prothorax subglobular, rather coarsely glossy, roundish granulate, scattered between the granulations fine pale greenish hair and pale greenish scales, the latter more densely accumulated at lateral margins. Elytra subovate, densely but irregularly rugosely glossy granulate, the granulation more acute than in *M. profanus,* with indistinct longitudinal rows of very fine pale greenish hair. Female dorsolaterally near base of each elytron with two rather large and prominent glossy protuberances and an oblong one at lateral margin basally. Legs black, sparsely beset with greenish white setæ.

Male, length, 6 to 6.7 millimeters (without rostrum); width, 2.8 to 3. Female, length, 7 to 7.6 millimeters (without rostrum); width, 3.1 to 3.4.

PALAWAN, Iwahig (*Schultze*); Bacuit (*Weber*); Taytay (*Schultze*).

Metapocyrtus (Trachycyrtus) palawanensis subsp. **acutituberculatus** subsp. nov. Plate 10, fig. 39, ♂, fig. 40, ♀ (lateral view).

Black; prothorax and elytra very sparsely beset with pale greenish scales, smaller than the typical form. The glossy roundish granulation on prothorax much denser and coarser, the sculpture on elytra more acute, in the female the protuberances near base more prominent.

Male, length, 6 millimeters (without rostrum); width, 2.6. Female, length, 5.5 to 6.2 millimeters (without rostrum); width, 2.6 to 2.8.

BUSUANGA, Concepcion (*G. Lopez*).

Metapocyrtus (Trachycyrtus) palawanensis subsp. **mangyanus** subsp. nov.

Differing from typical *palawanensis* as follows: Prothorax more subglobular, sides more uniformly rounded, the glossy granulation coarser. Elytra in apical half more strongly tapering toward apex, scale markings more pronounced.

Male, length, 5.8 to 6 millimeters (without rostrum); width, 2.6 to 2.8. Female, length, 7.3 millimeters (without rostrum); width, 3.4.

MINDORO, Mount Calavite (*Schultze*).

Metapocyrtus (Trachycyrtus) miser Faust. Plate 11, fig. 9, ♂, fig. 10, ♀ (lateral view).

Apocyrtus miser FAUST, Stett. Ent. Zeitg. (1895) 8.
Metapocyrtus (*Trachycyrtus*) *miser* Faust, HELLER, Philip. Journ. Sci. § D 7 (1912) 375.

Dark brown, with sparsely scattered pale greenish white scales on prothorax and elytra. Related to *M. profanus* Erichson but smaller, elytra more stoutly subovate, legs glossy red. Prothorax as long as broad, more uniformly and less coarsely granulate than *M. profanus*, with fine pale greenish setæ between the granulations. Lateral margins with sparsely scattered scales. Elytra subovate, finely and subrugosely granulate in irregular longitudinal rows, the granulation beset with fine short suberect hairs, which are more pronounced than in *M. profanus*. Apical decline with a subsutural row of slightly longer hair. Surface of elytra with sparsely scattered scales which are more condensed near lateral margins and have a tendency to form a cloudy transverse band in the middle, particularly in the females.

Male, length, 5.5 to 6.3 millimeters (without rostrum); width, 2.5 to 2.9. Female, length, 6 to 6.9 millimeters (without rostrum); width, 2.8 to 3.4.

LUZON, Benguet Subprovince, Baguio (*Schultze*); Trinidad (*Banks*); Palali (*A. Schick*).

This is the commonest species of this group in the mountainous regions around Baguio and seems to replace the *M. profanus* found in the lowlands. On several occasions I collected specimens of this species together with specimens of a chrysomelid, *Chrysopida* sp. ?, of reddish brown color, which has a strong mimicry resemblance to the above.

Metapocyrtus (Trachycyrtus) gibbicollis Faust. Plate 11, fig. 7, ♂, fig. 8, ♀ (lateral view).

Apocyrtus gibbicollis FAUST, Stett. Ent. Zeitg. (1895) 8.
Metapocyrtus (*Trachycyrtus*) *gibbicollis* Faust, HELLER, Philip. Journ. Sci. § D 7 (1912) 375.

Reddish brown, with very sparsely scattered pale greenish or bluish white scales at lateral margins of prothorax and elytra.

Related to but larger and slenderer than *M. miser* Faust. Rostrum rugosely punctured, with a shallow elongate medial depression and two very indistinct divergent ridges. Basal transverse groove rather distinct. Prothorax subglobular, dorsally very strongly bulgingly arched, densely and regularly glossy granulate, at lateral margins with a swarm of sparsely scattered scales. Elytra elongate subovate, finely and irregularly acutely granulate, the granulation dorsally coarser and subrugose, toward lateral margins finer, forming indistinct longitudinal rows. A minutely fine and short hair arising from each granule, the hairs gradually becoming longer toward apex, and a more-prominent row at apical sutural decline. Apical sutural decline in the female more uniformly curved than in the male. Apical sutural termination of elytra in the female with a small triangular excision, in the male evenly rounded. More or less densely scattered scales along lateral margins, which have a tendency in the female to form at the middle a very faint and indistinct transverse band. Legs glossy light reddish brown, sparsely beset with fine whitish setæ.

Male, length, 7 to 7.7 millimeters (without rostrum); width, 2.7 to 3. Female, length, 7.2 to 8.8 millimeters (without rostrum); width, 3 to 3.4.

LUZON, Benguet Subprovince, Baguio; Mount Santo Tomas (*Schultze*); Nueva Vizcaya Province, near Balete rest house (*Schultze and Schick*).

This species I collected, together with *M. miser* Faust, from the same plants. It somewhat resembles that species superficially, but is slenderer, and can be distinguished readily by the strongly bulgingly rounded prothorax.

Metapocyrtus (Trachycyrtus) spinipes Chevrolat. Plate 10, fig. 27, ♂, fig. 28, ♀ (lateral view).

Apocyrtus spinipes CHEVROLAT, Le Natur. 3 (1881) 363; HELLER, Philip. Journ. Sci. § D 7 (1912) 375.

Head and prothorax black, elytra and legs red or reddish brown to black. Prothorax with very sparsely scattered pale greenish bronze scales, elytra in the male with more or less scattered scales which are very dense at base, forming an irregular transverse band; in the female besides the basal band a less-pronounced and narrower transverse band in the middle laterally, not reaching to suture. The pale greenish bronze color of the scales changes mostly to a creamy white color. Rostrum rather coarsely subgranulately rugosely punctured, sparsely beset with fine pale hair, with an ill-defined medial depression and two more or less indistinct longitudinal ridges; lateral margin below the slightly swollen dorsolateral edge with an elongate groovelike depression which is confluent with antennal scrobe. Front coarsely rugosely punctured with a sharply defined medial groove. Prothorax subglobular, coarsely and regularly glossy, roundish granulate in some male specimens with a very indistinct medial groove in anterior half. Elytra subovate, irregularly rugose and finely subtuberculate, in apical half very sparsely beset with scattered short greenish hair, which is more pronounced in the female, at apical sutural decline; elytra in the female dorsolaterally near base without any protuberances, apical termination of each elytron obliquely blunt and slightly swollen. Underside black, beset with scattered whitish hair, mesosternum and metasternum laterally more or less densely beset with scattered scales. Legs moderately whitish setose, tibiæ below more densely setose and with a few fine and acute spinelike tubercles.

Male, length, 6.7 to 8 millimeters (without rostrum); width, 2.8 to 3.3. Female, length, 7 to 9 millimeters (without rostrum); width, 3.1 to 4.

LUZON, Rizal Province, Montalban Gorge (*Banks; Schultze*).

This species is easily differentiated from its allies by the rather strongly marked, mostly creamy white, basal transverse band.

Metapocyrtus (Trachycyrtus) magnigibbicollis sp. nov. Plate 6, fig. 9, ♂, fig. 10, ♀ (lateral view); Plate 12, figs. 60, 61.

Black; prothorax and elytra with scattered greenish bronze scales, body form exceptionally slender. Rostrum densely and irregularly confusedly punctured, fine whitish hair arising from the punctures, basal half with an ill-defined medial groovelike depression; male with two indistinct ridges divergent toward apex. Sides of rostrum, below dorsolateral edge, with an elongate groovelike depression confluent with antennal scrobe. Basal groove well defined. Front sparsely and rugosely punctured with a sharply defined medial grove. Prothorax subglobular, longer than broad, dorsally in apical half strongly bulgingly swollen, densely and uniformly granulate, with some sparsely scattered scales, particularly at lateral margins. Elytra elongate-elliptical, irregularly rugosely striate-punctate and finely subtuberculate, particularly in the female. The latter sex with a rather prominent tubercle on margin at basal lateral angle and another near base laterally, sutural area near base slightly swollen and more pronouncedly rugose. In both sexes elytra with scattered greenish bronze scales, which form small and very irregular spots. Legs sparsely beset with fine whitish setæ. Hind femora in the female extending slightly, in the male much beyond apex of elytra.

Male, length, 9.3 millimeters (without rostrum); width, 3.4. Female, length, 9.8 to 10.2 millimeters (without rostrum); width, 3.5 to 3.6.

NEGROS, Oriental Negros, Cuernos Mountains (*J. W. Chapman*).

This species can be readily distinguished by the generally slender form and the dorsally bulging prothorax, the width of which in both sexes is slightly less than that of elytra.

Metapocyrtus (Trachycyrtus) turgidofemoralis sp. nov. Plate 9, fig. 25, ♂, fig. 26, ♀ (lateral view).

Black; elytra dorsally with irregularly more or less densely scattered whitish scales. Rostrum densely and confusedly punctured, in the male slightly longer and dorsally in basal half with three elongate groovelike depressions confluent with transverse basal groove, the medial one of which is more strongly pronounced, and between the depressions two swollen ridges. Front rugose and scatteredly punctured with a fine medial groove. Prothorax subglobular, relatively much larger in the male, densely and uniformly granulate, the granulation gradually becoming finer toward and disappearing at lateral margins. Scattered scales between the granulations denser dorsolaterally. Prothorax in the male with an indistinct medial groove. Elytra very elongate-elliptical; in the male not so wide as prothorax, in the female slightly broader than prothorax; irregularly punctate, but dorsally irregularly rugose and subgranulate, the punctures more or less confluent. Female with suture basally strongly swollen. Dorsal area beset with more or less densely scattered whitish scales, which gradually disappear toward lateral margins and apical slope. Apical sutural decline in the female with a slight elongate swelling beset with fine whitish setæ, elytra in female with a small triangular excision at apical sutural termination. Legs reddish brown to black, very finely and sparsely setose. Femora with the club-shaped part extraordinarily strongly developed.

Male, length, 9.6 millimeters (without rostrum); width of prothorax, 3.9, of elytra, 3.5. Female, length, 9 millimeters (without rostrum); width of prothorax, 2.8, of elytra, 3.1.

LUZON, Laguna Province, Mount Banahao (*Schultze*).

Metapocyrtus (Trachycyrtus) chevrolati Waterhouse, Plate 10, fig. 31, ♂, fig. 32, ♀ (lateral view).

Apocyrtus chevrolatii WATERHOUSE, Ann. & Mag. Nat. Hist. 11 (1843) 251.

Metapocyrtus (*Trachycyrtus*) *chevrolati* Waterhouse, HELLER, Philip. Journn. Sci. § D 7 (1912) 374.

Apocyrtus subfasciatus SCHOENHERR, Gen. Curc. 8^2 (1844) 394; HELLER, Philip. Journ. Sci. § D 7 (1912) 374.

Black, with greenish blue or blue scale markings, legs reddish brown or black. Rostrum densely and confusedly punctured with two indistinct ridges near base and a strongly pronounced transverse basal groove. Front sparsely punctured, with a medial groove and some scattered scales. Prothorax densely and regularly granulate, with a faintly indicated medial groove, and rather densely covered with scales, except an ill-defined bare transverse band in the middle. Elytra subovate, rugose and finely tuberculate, near base dorsolaterally mostly with two more strongly pronounced small tubercular protuberances. A transverse scale band near base, another at middle, and the area of apical third covered with scales except an irregular triangular bare spot located on each elytron within apical third. Femora (cotype) reddish, apex of latter as well as tibiæ dark brown, tarsi black.

Male, length, 8 to 8.5 millimeters (without rostrum); width, 3.3 to 3.5. Female, length, 7.5 to 9 millimeters (without rostrum); width, 3.3 to 3.8.

LUZON, Ilocos Norte Province, Mount Palimlim (*Schultze*).

The color of the scale markings and the legs in this species are slightly variable; in a cotype, a male, from the British Museum the markings are bluish green, the legs reddish brown. Specimens from the above-named locality agree absolutely with the cotype in body shape, sculpture, and markings, except that the latter are uniform blue and the legs are black. This species is related to *M. concinnus* Waterhouse.

Metapocyrtus (Trachycyrtus) lagunaensis sp. nov. Plate 10, fig. 33, ♂, fig. 34, ♀ (lateral view).

Black, with greenish golden scale markings, nearly related to *M. chevrolati* Waterhouse, in general form slenderer and slightly larger than that species. Sculpture of rostrum, prothorax, and elytra similar but coarser than in *chevrolati* and the subbasal dorsolateral protuberances of that species absent. Prothorax more or less densely beset with brilliant golden greenish scales with an irregularly diffused transverse, more or less bare band before the middle. Elytra with the transverse golden greenish bands at base and in the middle broadly divergent toward and confluent at lateral margins, apical third entirely covered with scales. The two bare black transverse bandlike areas more or less reduced. Male at apex uniformly rounded; female, apex of each elytron obtusely rounded. Legs dark brown to black.

Male, length, 8.8 to 9 millimeters (without rostrum); width, 2.8 to 3. Female, length, 8.2 to 9.6 millimeters (without rostrum); width, 3.4 to 3.8.

LUZON, Laguna Province, Paete (*Schultze; Baker*).

This species has been confounded in the past with *M. chevrolati* Waterhouse but is certainly distinct from that species and is rather conspicuous by reason of the greenish golden scale markings which occupy a larger surface.

Metapocyrtus (Trachycyrtus) acutipennis Waterhouse. Plate 5, fig. 7, ♂, fig. 8, ♀ (lateral view).

Apocyrtus acutipennis WATERHOUSE, Ann. & Mag. Nat. Hist. 11 (1843) 252.

Metapocyrtus (Trachycyrtus) acutipennis Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 374.

Black, with bronzy green scale markings. Related to *M. chevrolati* Waterhouse. Rostrum rugose in basal half, with two indistinct longitudinal ridges and a shallow medial depression between them, basal transverse groove moderately pronounced. Front with a sharply defined medial groove and an irregular scale spot. Prothorax subglobular, rather coarsely and regularly granulate, the granulation more acute in the female. A scale band at anterior margin confluent with a large irregular scale patch at each lateral margin and dorsolaterally a large irregular scale patch. Elytra subovate, rugose, and irregularly tuberculate. Female with suture at basal fourth strongly swollen, another elongate sutural and indistinctly humplike swelling at beginning of apical decline, sutural apical termination of elytra with a roundish excision, each elytron acutely pointed. Elytra in the male uniformly rounded at apex. In both sexes an irregular, pale bronzy green scale band at base, another in the middle, both not reaching to suture; the latter confluent along lateral margin with a large triangular scale patch at apical third and an oblong sutural spot at apical decline, in the female located on the humplike swelling. Hind femora in the female not reaching to apex of elytra, in the male well beyond.

Male, length, 8.5 millimeters (without rostrum); width, 3.1. Female, length, 7.5 to 9.4 millimeters (without rostrum); width, 3 to 3.6.

MINDORO, Mount Calavite (*Schultze*); subranges of Mount Halcon; Pinamalayan (*Ramos*); Lake Naujan (*Taylor*).

I also examined a cotype (male) specimen from the British Museum. This very characteristic species seems not to be confined to Mindoro, since I received one specimen (female) from Occidental Negros, Cuernos Mountains (*Chapman*).

Metapocyrtus (Trachycyrtus) calavitensis sp. nov. Plate 10, fig. 7, ♂, fig. 8, ♀ (lateral view).

Black, with pale greenish scale markings forming large spots on the elytra. Related to *M. acutipennis* Waterhouse but smaller and stouter. Rostrum densely and confluently punctured with a shallow oblong depression in basal half. Front sparsely punctured with a fine medial groove, beset with scattered scales. Sides of head with an oblong scale spot below eye. Prothorax densely, not so regularly, and more acutely granulate than in *acutipennis,* with an ill-defined medial groove, a narrow scale band at anterior margin confluent with a large scale patch at each lateral margin and dorsally toward each side near posterior margin an irregular spot. Elytra subovate, relatively stout, very coarsely and irregularly striate-punctate and irregularly tuberculate, the punctures squarish. This sculpture is more pronounced in the female and in this sex about five more prominent tubercles are located near base laterally. Each elytron with two large and irregular scale spots at base, two others forming a cross row in the middle, and one very large, more or less triangular spot at apical third, this more or less connected by an irregular marginal stripe with one of the former. In the female an additional, rather indistinct, bifid sutural spot at beginning of apical decline, beset with a fine tuft of pale brownish hair, suture near base dull and slightly swollen but much less than in *acutipennis.*

Male, length, 6.8 millimeters (without rostrum); width, 2.9. Female, length, 7 to 7.4 millimeters (without rostrum); width, 3.1 to 3.4.

MINDORO, Mount Calavite (*Schultze*).

This species was collected together with *M. acutipennis* Waterhouse at the locality mentioned, but it is easily distinguishable from the latter by the different sculpture and markings.

Metapocyrtus (Trachycyrtus) sparsus Faust. Plate 10, fig. 1, ♂, fig. 2, ♀ (lateral view).

Apocyrtus sparsus FAUST, Stett. Ent. Zeitg. (1895) 9.
Metapocyrtus (*Trachycyrtus*) *sparsus* HELLER, Philip. Journ. Sci. § D 7 (1912) 374.

Piceous to black; prothorax and elytra with very pale pink, greenish, or white scale markings. Rostrum densely and confluently rugosely punctured with an elongate medial depression in basal half, the basal transverse groove indistinct. Front more sparsely and less densely rugosely punctured, with a fine medial groove and mostly an irregular scale spot. Prothorax subglobular, as broad as long in the female but broader in the male; anteriorly more narrowly truncate than at base, rather coarsely and rugosely granulate-punctate with a minutely fine whitish hair arising from each puncture and a more or less pronounced but basally abbreviated medial groove. Dorsolaterally a mostly interrupted longitudinal scale stripe and another irregular stripe at each lateral margin. Elytra subovate, slightly broader than prothorax in the male, but much broader in the female; coarsely and rugosely punctate-striate, the interstices slightly swollen and subgranulate, with the following scale markings: Each elytron with two spots near base; three form an irregular crossrow at the middle; at apical third in the second interstice a longitudinal row of three or four spots; two other spots more laterally; and an elongate spot at lateral margin behind the middle. Minutely fine short hairs arise from the punctures, which are slightly longer toward apex. Underside and legs beset with scattered whitish hair.

Male, length, 7.4 to 8 millimeters (without rostrum); width, 3.4 to 3.7. Female, length, 7 to 8.8 millimeters (without rostrum); width, 3.7 to 4.2.

LUZON, Benguet Subprovince, Baguio, Mount Santo Tomas (*Schultze*).

This species is mostly found on small trees of *Pinus insularis* Endl.

Metapocyrtus (Trachycyrtus) banahoensis sp. nov. Plate 10, fig. 3, ♂, fig. 4, ♀ (lateral view).

Reddish brown to black; prothorax and elytra with light bronzy green scale spots. Nearly related to *M. sparsus* Faust.

Rostrum coarsely and rugosely confluently punctured, in basal half with a shallow medial depression, two indistinct ridges divergent toward apex, and dorsolaterally another smaller elongate depression. Basal transverse groove well pronounced, the front slightly depressed, bearing a large rectangular scale spot and an indistinct medial groove. Prothorax subglobular, as long as broad, in the male relatively larger and more nearly globular, coarsely and irregularly granulate with a basally abbreviated medial groove. Dorsolaterally, slightly before the middle between anterior and posterior margins, a roundish or oval scale spot, and at each lateral margin a larger irregular spot. Elytra subovate, coarsely and irregularly striate-punctate, the punctures toward lateral margins finely subtuberculate. Each elytron with eight pale bronzy green scale spots, two near base, two others forming a cross row at the middle, one behind the middle at lateral margin, and three in apical third of which two, at the third interstice, are sometimes confluent, forming a short stripe. Male, mesosternum, metasternum, and first abdominal sternite in the middle with a patch of rather dense hair; female, underside with sparsely scattered hair. Legs rather sparsely beset with short setæ.

Male, length, 8 to 9 millimeters (without rostrum); width, 3.5 to 4. Female, length, 7.6 to 7.8 millimeters (without rostrum); width, 3.4 to 3.6.

LUZON, Laguna Province, Mount Banahao and Paete (*Baker; Schultze*).

Metapocyrtus (Trachycyrtus) banahaoensis subsp. **davanganus** subsp. nov. Plate 7, fig. 10, ♀ (lateral view).

Black, the sculpture very similar but less strongly pronounced than in typical *M. banahaoensis* sp. nov. The pale bronze greenish markings differ from the typical form as follows: Prothorax with an elongate scale spot dorsolaterally in basal half, lateral margins with a stripe reaching from anterior to posterior margin. Each elytron with eleven scale spots, two near base, one marginal spot before the middle, three spots forming a transverse row at about the middle, four large elongate spots forming another, more oblique, transverse row in apical half, and one smaller spot near apex.

LUZON, Kalinga Subprovince, Davangan (*Herre*).

Metapocyrtus (Trachycyrtus) germari Waterhouse. Plate 10, fig. 6, ♀ (lateral view); Plate 12, figs. 58, 59.

Apocyrtus germari WATERHOUSE, Ann. & Mag. Nat. Hist. 11 (1843) 249.

Metapocyrtus (*Trachycyrtus*) *germari* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 374.

Black, with pale green scale markings, scape of antennæ and femora dark reddish brown. Rostrum densely and rugosely punctured, beset with fine whitish hair, basal transverse groove indistinct, front also rugosely punctured with a fine medial groove and beset with scattered scales. Prothorax subglobular, slightly broader than long, closely and coarsely granulate, the granules glossy, scattered between the latter very minutely fine hair, an irregular transverse band of scattered scales at anterior margin and another, dorsally interrupted band near base, both confluent in an irregular patch at lateral margins. Elytra stout subovate, finely and irregularly subtuberculate and subrugosely punctured with three irregular transverse bands of pale green scales, at base, in the middle, and at apical third; besides some scattered spots subapically. The bands are formed by irregular patches of scales and are more or less interrupted. Apical decline subsuturally with a row of fine whitish setæ in both sexes and some scattered setæ in apical area. Hind femora in the female reaching to apex of elytra, in the male beyond.

Male, length, 5.8 to 6.8 millimeters (without rostrum); width, 2.8 to 3. Female, length, 6.5 to 7.8 millimeters (without rostrum); width, 3 to 3.9.

LUZON, Ilocos Norte Province, Bangui (*Banks; McGregor*); Piddig (*McGregor*).

A female specimen from the British Museum, compared with the type, agrees perfectly with specimens from the locality mentioned.

Metapocyrtus (Trachycyrtus) banguiensis sp. nov. Plate 10, fig. 5, ♂ (lateral view).

Nearly related to *M. germari* Waterhouse; black, with yellow scale markings. Rostrum and front similar to those in the latter species. Prothorax subglobular, as long as broad, granulate, the glossy granulation finer and more distantly spaced than in *germari*. Toward each side dorsolaterally an irregular longitudinal stripe, interrupted in the middle, thus forming at anterior and posterior margins an irregular scale spot; another irregular scale patch at each lateral margin. Elytra more elongate subovate, finely and irregularly granulate, the granulation glossy, irregular spots of yellow scales forming interrupted transverse bands at base, in the middle and at apical third, at subapical area some smaller, scattered spots, and subsuturally a row of fine whitish setæ similar to those in *M. germari*. Legs black.

Male, length, 6 millimeters (without rostrum); width, 2.6.

LUZON, Ilocos Norte Province, Bangui (*Banks*).

This species is at once distinguishable from *M. germari* Waterhouse by the different sculpture and the yellow markings; it is also slenderer than that species.

Metapocyrtus (Trachycyrtus) concinnus Waterhouse. Plate 10, fig. 23, ♂, fig. 24, ♀ (lateral view).

Apocyrtus concinnus WATERHOUSE, Ann. & Mag. Nat. Hist. 11 (1843) 253.

Metapocyrtus (*Trachycyrtus*) *concinnus* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 374.

Black, with pale golden green scale markings, very similarly arranged as in *M. chevrolati* Waterhouse but less sharply defined and smaller; legs black. In old specimens the scale markings change to creamy white. The original description is as follows:

> Apocyrtus concinnus
>
> Ap. niger, parum nitidus; rostro rugoso; thorace subgloboso, crebre tuberculato, pone medium linea transversa, marginibus anticis lateralibusque aureo-viridibus; elytris ovatis, crebre tuberculatis, ad apicem fasciisque duabus, aureo-viridibus. Long. corp. 4 lin.
>
> This species very closely resembles the Ap. acutipennis (like that, differing from Ap. Chevrolatii in having black legs), but differs in having the markings of a golden-green colour, a narrow band on the thorax rather behind the middle, and the whole apex of the elytra covered with scales; these, though somewhat scattered, do not arrange themselves into spots as in acutipennis. In form and sculpturing there are moreover some points of distinction. The rostrum is very rugose, and does not exhibit any longitudinal channel; the elytra in the female are not produced into an acute angle at the apex as in acutipennis, and the terminal segment of the abdomen in this sex is destitute of the large fovea, and is rather coarsely punctured. The elytra are more thickly tuberculated. The space between the eyes is considerably broader and more distinctly punctured than in Ap. Chevrolatii.

Male, length, 5.5 to 6 millimeters (without rostrum); width, 2.2 to 2.4. Female, length, 6.8 millimeters (without rostrum); width, 2.5.

NEGROS, Occidental Negros Province, Nakalang (*Banks*); Fabrica (*Schultze*).

A cotype specimen, a male, from the British Museum, agrees perfectly with specimens from the locality mentioned.

Metapocyrtus (Trachycyrtus) socius sp. nov. Plate 9, fig. 1, ♂, fig. 2, ♀ (lateral view).

Black, with pale blue, in old specimens whitish, narrow transverse scale bands. Related to *M. chevrolati* Waterhouse, with the scale markings very similar but narrower and usually more sharply defined. Rostrum irregularly and subrugosely punctured, with fine, transversely directed, whitish hair arising from the punctures, and an indistinct elongate medial depression, basal transverse groove well pronounced. Front scatteredly punctured, with a sharply defined medial groove. Prothorax slightly broader than long, rather coarsely and regularly glossy granulate, without any trace of a medial groove. At anterior margin a narrow scale band and another narrow transverse band slightly behind the middle, both bands confluent, at sides above fore coxæ with a relatively small and irregular scale patch. Elytra subovate, irregularly subrugosely punctured and tuberculate, female with the sutural region at base finely dull rugose and distinctly swollen, in both sexes with a narrow scale band at base, in the middle, and at apical third, all three bands mostly confluent with an irregular marginal stripe. These bands are interrupted at suture, except in the male, in which the basal band is not interrupted. The third band is mostly confluent with an irregular longitudinal stripe at apical third, thus forming a more or less ill-defined subapical triangular figure. Elytra also with indistinct rows of minutely fine hair, the latter more pronounced at apical region. Female with apical sutural decline indistinctly swollen and with an indistinct patch and two subsutural rows of coarse but short hair. Underside and legs scatteredly whitish setose.

Male, length, 6.6 to 7.8 millimeters (without rostrum); width, 2.7 to 3.1. Female, length, 7.6 to 8 millimeters (without rostrum); width, 3.2 to 3.4.

NEGROS, Occidental Negros, Fabrica (*Schultze and L. J. Reyes*).

This species has a certain resemblance to, and was collected at the same locality with, *M. concinnus* Waterhouse. The latter species is smaller, and the scale markings are pale greenish golden and are more ill defined.

Metapocyrtus (Trachycyrtus) socius subsp. **calivoensis** subsp. nov. Plate 6, fig. 1, ♂, fig. 2, ♀ (lateral view).

Black; scale markings pale bronzy green; in general larger than typical *M. socius* sp. nov. Rostrum irregularly and more coarsely but not subrugosely punctured. Prothorax much coarser and more regularly granulate; elytra also much coarser but less subrugosely punctured.

Male, length, 8.4 millimeters (without rostrum); width, 3.3. Female, length, 9.5 millimeters (without rostrum); width, 4.1.

PANAY, Capiz Province, Calivo (*G. Edaño*).

Metapocyrtus (Trachycyrtus) apoensis sp. nov. Plate 4, fig. 10, ♂, fig. 11, ♀ (lateral view).

Black, with bright bronze green scale markings, which form rather well-defined transverse bands on prothorax and elytra. Legs red, except femora and tibiæ which are fuscous apically, tarsi black. Related to *M. concinnus* Waterhouse. Rostrum dorsally slightly convex, irregularly punctured, fine whitish hair, transversely arranged, arising from the punctures; in basal half with two fairly pronounced, short, glossy, longitudinal swollen ridges and three elongate depressions, one medial which is more pronounced, and near each dorsolateral edge another, more indistinct depression. Front also punctured and with some fine whitish hair and some scattered scales. Prothorax subglobular, coarsely glossy, roundish granulate, with bright bronze green scales which form a broad band along anterior margin and are confluent at lateral margins. Elytra short subovate, irregularly subrugosely punctured and finely tuberculate. Female at beginning of apical decline with a small bifid roundish protuberance beset with a rather large bifid tuft of pale prown setæ. Elytra with two well-defined transverse scale bands, at base and in middle, apical third almost entirely beset with scales. Underside and legs sparsely beset with fine suberect whitish hair.

Male, length, 4.7 to 5 millimeters (without rostrum); width, 2.1 to 2.2. Female, length, 5.5 to 6 millimeters (without rostrum); width, 2.6 to 2.9.

MINDANAO, Davao Province, Mount Apo (*J. Clemens*).

Chaplain Clemens brought back a large series of this interesting species from his recent trip to the above-mentioned little-explored region.

Metapocyrtus (Trachycyrtus) adspersus Waterhouse. Plate 10, fig. 35, ♂, fig. 36, ♀ (lateral view).

Apocyrtus adspersus WATERHOUSE, Ann. & Mag. Nat. Hist. 11 (1843) 254.

Metapocyrtus (*Trachycyrtus*) *adspersus* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 375.

Black; prothorax and elytra with scattered greenish golden scales, antennæ and femora reddish brown, tibiæ dark brown. Rostrum densely and rugosely punctured, with an elongate medial depression and two indistinct longitudinal ridges slightly divergent toward apex, basal transverse groove rather strongly defined. Front confusedly punctured with a fine medial groove and some scattered scales. Prothorax subglobular, rather coarsely and irregularly granulate, the granulation glossy, sparsely scattered greenish golden scales between the granules. Elytra subovate, broader than prothorax, rugose and finely but irregularly glossy granulate with irregularly scattered scales. In the female the suture near base swollen, apical sutural termination with a triangular excision. In some specimens the scales are less numerous in certain areas before and behind the middle of each elytron, producing the effect of darker patches, particularly in the females.

Male, length, 5.6 to 6 millimeters (without rostrum); width, 2 to 2.2. Female, length, 6 to 6.8 millimeters (without rostrum); width, 2.7 to 2.8.

BOHOL, Bilar (*Ramos; Duyag*). LEYTE, Palompon (*Elicaño*). SAMAR, Wright (*McGregor*). BILIRAN (*McGregor*).

A specimen, a male, from the British Museum, compared with the type, agrees perfectly with specimens from the first locality mentioned. The specimens from the other localities show very slight variation.

Metapocyrtus (Trachycyrtus) pulverulentus Waterhouse. Plate 10, fig. 37, ♂, fig. 38, ♀ (lateral view).

Apocyrtus pulverulentus WATERHOUSE, Ann. & Mag. Nat. Hist. 11 (1843) 254.

Metapocyrtus (*Trachycyrtus*) *pulverulentus* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 375.

Black; prothorax and elytra with scattered light green scales; antennæ and legs dark reddish brown, beset with fine whitish hair. Rostrum densely and rugosely punctured, with an indistinct narrow medial depression in basal half, basal transverse groove well pronounced, front with scattered scales. Prothorax subglobular, irregularly granulate, the granulation glossy, between the granules scattered scales which are denser at lateral margins. Elytra subovate, in both sexes broader than prothorax, finely and very irregularly subtuberculate, with more densely scattered scales than in *M. adspersus* Waterhouse. The individual scales are also smaller than in the latter species. Female, sutural termination of elytra with a small semicircular excision.

Male, length, 5.6 millimeters (without rostrum); width, 2.2. Female, length, 5.7 to 6.7 millimeters (without rostrum); width, 2.4 to 2.8.

LUZON, Tayabas Province, Laguimanoc (*Schultze*).

A specimen (female) from the British Museum, collected by Whitehead, labeled "S. Luzon," was compared with the type; it agrees perfectly with my specimens from the locality mentioned.

Metapocyrtus (Trachycyrtus) nanus Boheman. Plate 10, fig. 19, ♂, fig. 20, ♀ (lateral view).

Apocyrtus nanus Boheman, SCHOENHERR, Gen. Curc. 8^2 (1845) 397.
Metapocyrtus (*Trachycyrtus*) *nanus* Boheman, HELLER, Philip. Journ. Sci. § D 7 (1912) 374.

Since I know this species only from the original description I prefer to give the same, as follows:

A nanus. (Schh.)—Oblongus, niger, squamulis laete viridibus sat dense obsitus; pedibus ferrugineis, rostro sulcato; thorace ovato, crebre granulato, lateribus modice rotundato-ampliato; elytris confertim granulatis.

Patria: Insulae Philippines. Dom. Walton. Mus. Schh.

Statura Apocyrti profani, sed duplo minor; elytris evidenter granulatis, ab illo mox distinctus. Caput mediocre, crassum, supra paulo convexum, confertim punctulatum, nigrum, sub-opacum, squamulis laete viridibus adspersum; oculi rotundati, parum prominuli, nigri; rostrum longitudine capitis sed illo nonnihil angustius, crassum, sub-teres, rectum, subtiliter crebre ruguloso-punctatum, medio leviter sulcatum, basi striga transversa insculptum, nigrum, sub-opacum, sat crebre laete viridi-squamosum. Antennae tenues, nigro-piceae, parce pilosae; clava oblonga, acuminata, cinereo-pubescente. Thorax ovatus, apice oblique truncatus, antice posticeque angustatus, intra apicem linea transversa impressus, lateribus modice aequaliter rotundato-ampliatus, basi truncatus, reflexo-marginatus, supra convexus, granulis crebris, nitidis adspersus; totus niger, squamulis parvis, rotundis, laete viridibus sat dense obsitus. Scutellum nullum. Elytra subovata, antice truncata, reflexo-marginata, thoracis basi non latiora, lateribus ad medium modice ampliata, ibique thoracis medio haud latiora, apice angustata et conjunctim acute rotundata, thorace dimidio longiora, supra valde convexa, evidenter confertim inordinate granulata, nigra, parum nitida, squamulis minutis, orbiculatis, laete viridibus sat dense obsita. Corpus subtus sub-laeve, nigrum, squamulis laete virescentibus parce adspersum.

Pedes elongati, validi, rufo-ferruginei, breviter albopilosi; femoribus valde clavatis, muticis; tibiis subteretibus, rectis, anticis apicem versus nonnihil inflexis, obsolete denticulatis; tarsis modice dilatatis, subtus brunneo-spongiosis.—Bhn.

Certain specimens, which I believe have been correctly identified as belonging to the above small and difficult species, are nearly related to *M. pulverulentus* Waterhouse. The present species is of about the same size as *M. pulverulentus*, but in general form is stouter in both sexes, the glossy granules on prothorax are more numerous and more acute, and the sculpture on elytra is coarser.

Male, length, 5 to 6.6 millimeters (without rostrum); width, 2.4 to 2.5. Female, length, 6 to 6.7 millimeters (without rostrum); width, 2.7 to 2.9.

NEGROS, Occidental Negros, Maao (*Banks*); Fabrica (*Schultze*); Cuernos Mountains (*Chapman*).

Metapocyrtus (Trachycyrtus) tawiensis sp. nov. Plate 4, fig. 21, ♂, fig. 22, ♀ (lateral view).

Black, with fine and irregularly scattered golden green scales, the latter forming diffused transverse bands on the elytra. Nearly related to *M. nanus* Boheman and *M. palawanensis* sp. nov., but differing slightly in form from both in that the prothorax is more subglobular and the elytra are stouter. The female is at once distinguished from that of *palawanensis* in the elytra not having the glossy protuberances basally. Rostrum rugosely punctured with an indistinct medial depression in basal half, rather densely beset with transversely directed short hair which is coarser than in *palawanensis*. Basal transverse groove rather well pronounced. Sides of head below eye densely beset with golden greenish scales, not scalelike hairs as in *palawanensis*. Prothorax broader than long, sides uniformly rounded, densely and irregularly glossy granulate with scattered scales which are more densely accumulated at sides. Between the granulations sparsely scattered, very fine and short golden hair. Elytra stout subovate, finely irregularly subrugosely tuberculate with a minutely fine hair arising behind each tubercle. The sculpture in this species is finer, more acute, and less dense than in *palawanensis*. Golden green scales are scattered over the elytra, less densely dorsally and more densely toward and along the lateral margins, but at each elytron are two bare transverse bandlike areas located before and behind the middle. Legs rather densely beset with short golden setæ, hind femora in basal half dorsally with scattered greenish golden scales.

Male, length, 5.1 to 5.8 millimeters (without rostrum); width, 2.3 to 2.6. Female, length, 5.7 to 6.7 millimeters (without rostrum); width, 2.6 to 3.2.

JOLO, Mount Dajo; TAWITAWI; BUNGAU; BANARAN and BILATAN of the Sulu Islands (*Duyag*).

Metapocyrtus (Trachycyrtus) immeritus Boheman. Plate 9, fig. 15, ♂, fig. 16, ♀ (lateral view).

Apocyrtus immeritus Boheman, SCHOENHERR, Gen. Curc. 8^2 (1845) 395.

Metapocyrtus (*Trachycyrtus*) *immeritus* Boheman, HELLER, Philip. Journ. Sci. § D 7 (1912) 374.

Black, with densely, rather uniformly, scattered green scales, femora and tibiæ dark reddish brown. Rostrum densely rugosely punctate, basal half with a shallow medial depression and two indistinct ridgelike swellings which are convergent toward the rather slightly pronounced basal transverse groove. Front rugosely punctate with a fine medial groove, beset with scattered scales, some of which extend to behind eye and are confluent with a scale spot below eye at sides of head. Prothorax subglobular, irregularly granulate with irregularly scattered scales between the granules, the scales more condensed at lateral margins. Elytra subovate, finely and irregularly rugosely granulate with rather densely and uniformly scattered green scales. Female at base laterally with an indistinct shallow depression, and in some specimens with a few small but more pronounced tubercles, suture basally slightly swollen, at the beginning of apical sutural decline an oblong patch of pale brownish setæ. Male with a sutural row of finer setæ at apical decline.

Male, length, 9.6 millimeters (without rostrum); width, 4. Female, length, 8.3 to 9.8 millimeters (without rostrum); width, 3.9 to 4.4.

DALUPIRI, Babuyan group (*McGregor and Worcester*).

One specimen, a female, which I obtained in exchange, was determined also by Heller as this species; it agrees perfectly with the specimens from the locality mentioned.

Metapocyrtus (Trachycyrtus) sibayensis sp. nov. Plate 10, fig. 29, ♂, fig. 30, ♀ (lateral view).

Dark reddish brown to black, with irregularly scattered creamy white scales, femora and tibiæ red to reddish brown.

Superficially very similar to *M. immeritus* Boheman but smaller. Rostrum finely and irregularly rugosely granulate, beset with fine setæ, with an indistinct medial groove which becomes sharply defined on front. Latter also rugose with some scattered scales which extend around eye and form an indistinct spot below eye. Prothorax subglobular, very irregularly granulate, the granulations small, roundish and glossy, between them irregularly scattered scales. Elytra subovate, irregularly rugose and granulate, and rather densely beset with scattered scales; very minutely fine and short creamy white setæ forming longitudinal rows at broad intervals. Female dorsolaterally at base with one large and prominent and two smaller tubercles. Sutural apical decline in the male uniformly and evenly curved, in the female near apex more abrupt and at the beginning of slope a slight and indistinct elongate sutural swelling, more densely beset with scales and some scattered setæ. Apex in both sexes uniformly rounded. Legs beset with short creamy white setæ, femora with some scattered scales at apical half.

Male, length, 6.5 millimeters (without rostrum); width, 2.7. Female, length, 7.4 millimeters (without rostrum); width, 3.5.

SIBAY, in the Semirara group, between Mindoro and Panay (*Worcester*).

The elytra of this species are slenderer than the elytra of *M. immeritus* Boheman.

Metapocyrtus (Trachycyrtus) sabtangensis sp. nov. Plate 9, fig. 29, ♂, fig. 30, ♀ (lateral view).

Black, with very small irregularly scattered pale yellowish scales. Related to *M. sibayensis* sp. nov. Rostrum finely rugosely granulate, beset with very fine setæ and some scattered scales, the setæ less prominent than in that species. The ill-defined basal transverse groove confluent at sides in front of eye, with a deep pitlike depression which is confluent with antennal scrobe. Front subrugosely punctured and beset with scattered scales. Prothorax as long as broad, rather densely and uniformly roundish granulate, the granulation less acute than in *M. sibayensis* and beset with irregularly scattered scales; also sparsely but uniformly beset with very fine and short whitish hair. Elytra subovate, dorsally irregularly transversely subrugosely granulate, toward sides the granulation more scattered and more acute, with irregularly scattered scales and minutely fine hair arranged in indistinct longitudinal rows, more prominent toward apex. Male at apical decline with several denser rows of slightly longer creamy white hair; female at beginning of apical decline with a slight sutural swelling, beset with a relatively large oblong-oval patch of dense creamy white setæ, the latter more prominent than in *M. sibayensis.* Legs, except the dark brown femora, black, sparsely beset with fine setæ.

Male, length, 8 millimeters (without rostrum); width, 3.5. Female, length, 5.9 to 8 millimeters (without rostrum); width, 2.8 to 3.8.

SABTANG and BATAN, Batan group, August 16 and 17, 1909 (*Worcester*).

Metapocyrtus (Trachycyrtus) vestitus sp. nov. Plate 9, fig. 3, ♂, fig. 4, ♀ (lateral view).

Black, with sparsely scattered pale yellowish scales. Related to *M. sibayensis* sp. nov., but smaller and the elytra shorter subovate. Rostrum densely confluently punctured, beset with fine whitish hair, basal half with a rather strongly pronounced medial depression and two irregular, subrugose longitudinal ridges. Basal transverse groove confluent with a pitlike depression on sides, in front of eye, and the latter united with antennal scrobe. Front rugosely punctured with a sharply defined medial groove and some scattered scales. Prothorax subglobular, densely and uniformly roundish granulate, the granulation finer than in *M. sibayensis,* and sparsely scattered with yellowish scales. Elytra subovate, finely and irregularly subrugosely granulate; the granulation more acute than in that species, and with indistinct longitudinal rows of minutely fine hairs and sparsely scattered scales. Elytra in the female also near base dorsolaterally with two more or less prominent oblong tubercles; apical decline along suture uniformly beset with slightly longer setæ which do not form any distinct patch. Legs dark brown, moderately densely beset with setæ.

Male, length, 5.7 to 6.1 millimeters (without rostrum); width, 2.7 to 2.9. Female, length, 6.3 to 7.3 millimeters (without rostrum); width, 3 to 3.2.

SIBUYAN and ROMBLON, June, 1904 (*McGregor*).

Metapocyrtus (Trachycyrtus) rostrogibbosus sp. nov. Plate 7, fig. 11, ♀ (lateral view).

Black, with uniformly scattered pale greenish scales. In superficial aspect very similar to *M. immeritus* Boheman but the scales on elytra not so dense. Female, rostrum rather strongly divergent toward apex, scatteredly punctured, in the middle with a broad shallow depression, at base before the deep basal transverse groove with a prominent hump. Front with a few punctures and a fine medial groove. Prothorax broader than long, irregularly granulate, the granulation rather coarse and glossy; between the granules irregularly scattered scales, more condensed at lateral margins. Elytra subovate, irregularly rugosely granulate, the granulation finer than on prothorax, and beset with scattered pale greenish scales which are more numerous toward lateral margins. Elytra just above apex with two prominent obtuse spines, which approximate each other closely. Male unknown.

Female, length, 9.5 millimeters (without rostrum); width, 4.

LUZON, Tayabas Province, Gumaca (*F. W. Foxworthy*).

The peculiar hump on the rostrum of this species is similar to that in *M. elegans* Waterhouse, but more strongly pronounced. Analogous to other species, I suspect that in the male of this species the hump on the rostrum as well as the subapical spines will be found wanting.

Metapocyrtus (Trachycyrtus) viridulus Chevrolat.

Apocyrtus viridulus CHEVROLAT, Le Natur. 3 (1881) 439.

Since this species is unknown to me I prefer to give the original description, as follows:

Apocyrtus viridulus—Long. 8½ mill., lat. 2½ mill.

Elongatus, niger, squamulis viridibus tectus, macula laterali in elytris, corpore quo pedibus longioribus nigris; femoribus clavatis, tibiis anticis curvatis, serie-spinulosis, rostro recto, supra sat dense at minute granuloso, longitudine convexe, ante oculos scisso. Antennis nigris; scapo longo clavato, art. 2 funiculi elongatis-prothorace subgloboso, antice posticeque truncato, minute tuberculato, postice sulcato. Elytris ovalibus, in basi anguste viridi pallide limbatis, ad apicem obtuse productis, supra minute granulosis.

Ins. Philip. Typus Auct. Ex. Mus. Lacordaire.

Metapocyrtus (Trachycyrtus) viridans sp. nov. Plate 9, fig. 5, ♂, fig. 6, ♀ (lateral view).

Black, densely beset with greenish golden scales. Elytra in the female terminating apically in two prolonged subconnate spines. Rostrum in the male narrower and slightly longer than in the female, apically finely and densely irregularly punctured, dorsally toward base with an indistinct groovelike medial depression and two indistinct longitudinal ridges, the surface sparsely beset with transversely directed golden hair, in the medial depression some scattered scales. Sides of head and front rather densely beset with scales. Front with a sharply defined medial groove. Prothorax hardly broader than long, irregularly rugosely punctured, densely and uniformly beset with greenish golden scales. Elytra oblong-elliptical, confusedly subrugosely punctate, and densely beset with greenish golden scales. Apical region in both sexes with rows of relatively long but rather distantly interspaced hair. Female at apical third with a prominent bifid sutural protuberance beset with scattered hair, elytra at apex prolonged into two subconnate spines. Underside and legs in both sexes with scattered pale golden setæ; mesosternum and metasternum more or less densely beset with greenish golden scales, first and second abdominal sternites with a scale patch laterally.

Male, length, 7.5 millimeters (without rostrum); width, 2.7. Female, length, 9 millimeters (without rostrum); width, 3.1.

LUZON, Rizal Province, Mount Lumutan, about 700 meters (*Ramos*).

This species has also relatively long antennæ and seems to be related to *M. viridulus* Chevrolat.

Metapocyrtus (Trachycyrtus) joloensis sp. nov. Plate 6, fig. 29, ♂, fig. 30, ♀ (lateral view).

Black, with irregularly moderately densely scattered bronzy green scales. In superficial aspect and size similar to *M. viridans* sp. nov. Rostrum finely irregularly punctured and beset with fine scattered scales, in basal half an oblong triangular depression and two V-shaped ridges convergent near base; in the female the ridges more strongly swollen, particularly before basal transverse groove. Lateral margins of rostrum with a groovelike depression below dorsolateral edge confluent with antennal scrobe. Prothorax broader than long, irregularly granulate, between the glossy granulations irregularly more or less densely scattered fine bronzy green scales and very minutely short hair. Female discally with a sharply defined, slightly raised, lancet-shaped smooth area, the granulation at lateral margins very coarse and rather bulging. Elytra subovate, in the male apically regularly rounded, in the female apically obtusely pointed, triangularly prolongate, in both sexes finely irregularly subrugosely tuberculate and irregularly more or less densely beset with scattered scales and minutely fine short hairs which increase in length toward apex. Legs sparsely beset with short greenish bronze setæ.

Male, length, 6.5 to 7.7 millimeters (without rostrum); width, 2.7 to 3. Female, length, 8 to 8.4 millimeters (without rostrum); width, 3.1 to 3.5.

JOLO, Mount Dajo, August and September, 1924 (*Duyag*).

This very characteristic species is easily recognized, particularly in the female, by the lancet-shaped, smooth and slightly raised discal area of the prothorax, which character is not found in any other species of this subgenus.

During a recent collecting trip to the Sulu Islands my collector visited the following localities: Jolo, twenty days; Tawitawi, twenty-six days; Bungau, eighteen days; Banaran, two days; and Bilatan two days. Only two species of *Metapocyrtus* were encountered, one, the present one, which seems to be confined to Jolo; the other species, mentioned elsewhere, was found at all of the localities named, indicating a much wider distribution.

Metapocyrtus (Trachycyrtus) pseudoviridans sp. nov. Plate 9, fig. 7, ♂, fig. 8, ♀ (lateral view).

Black, rather densely and uniformly beset with metallic bronze green scales. In general superficial aspect similar to *M. viridans* sp. nov. but stouter, the elytra in the female differing from it in not terminating apically in two spines. Rostrum densely confusedly rugosely punctured with fine whitish hair arising from the punctures, with an indistinct elongate medial depression and two, also indistinctly pronounced, longitudinal ridges. The medial depression near base with some scattered scales. Basal groove connected with an elongate depression at each lateral margin, the latter confluent with antennal scrobe. Sides of head also beset with scattered scales. Front rugosely punctured with a sharply defined medial groove and beset with scattered scales. Prothorax slightly broader than long, in the male nearly as broad as the elytra; irregularly granulate, beset with rather densely scattered bronze green scales between the granulations, also with some extremely fine and small hairs sparingly scattered between them. Elytra subovate, in the male rounded at apex, in the female with a slight triangular excision; irregularly rugosely punctured and subgranulate, particularly in the female; rather densely and uniformly beset with bronze green scales in the male; in the female the scales more irregularly and less densely scattered, except near base, and at the middle the scales denser, forming an indistinct transverse band. In both sexes the elytra also with irregular longitudinal rows of extremely minute hairs, more pronounced apically along suture and in apical region, particularly in the female. Underside and legs sparsely but coarsely whitish setose.

Male, length, 7.9 to 9 millimeters (without rostrum); width, 3 to 3.2. Female, length, 8.7 to 9.4 millimeters (without rostrum); width, 3.4 to 3.9.

LUZON, Rizal Province, Mount Lumutan, about 700 meters (*Ramos*).

In old specimens of this species the bronze green scales change to a creamy white color and the individual scales are slightly smaller than those in *M. viridans.* This species was collected with *viridans,* from the same plants.

Metapocyrtus (Trachycyrtus) smaragdinus sp. nov. Plate 4, fig. 12, ♂, fig. 13, ♀ (lateral view).

Black; prothorax and elytra with uniformly densely scattered smaragd, or emerald, green sparkling scales, legs black except femora reddish brown. In general form similar to *M. pseudoviridans* sp. nov. but smaller and differing from it as follows: Granulation of prothorax more irregular and more acute, sculpture of elytra finely but acutely and irregularly tuberculate, with sparkling scales which are less dense than in that species. Elytra at apex in both sexes rounded. Underside and legs sparsely beset with fine whitish setæ.

Male, length, 6 to 6.4 millimeters (without rostrum); width, 2.5 to 2.6. Female, length, 6.9 to 8 millimeters (without rostrum); width, 2.9 to 3.4.

LUZON, Nueva Vizcaya Province, near Balete Pass (*Schultze*).

Metapocyrtus (Trachycyrtus) bispinosus Waterhouse.

Apocyrtus bispinosus WATERHOUSE, Ann. & Mag. Nat. Hist. 11 (1843) 253.

Metapocyrtus (*Trachycyrtus*) *bispinosus* Waterhouse, HELLER, Philip. Journ. Sci. § D 7 (1912) 374.

Since this species is unknown to me I give the original description, as follows:

Apocyrtus bispinosus

Ap. niger, squamis viridibus adspersis; thorace valde globoso, tuberculis crebre obsito; elytris rugosis, subseriatim tuberculatis, ad apicem bispinosis; femoribus rufescentibus. Long. corp. 3¾ lin.

This species is less than the *Ap. impius* of Erichson, and has the elytra more constricted at the base. The rostrum is thickly punctured, and has a broadish but shallow longitudinal impression; it is separated from the head by a transverse groove, which runs on each side into a large fovea situated immediately in front of the eye; these lateral pits contract the hinder part of the rostrum, which is somewhat humped and raised above the plane of the head. The head is distinctly punctured between the eyes, where there is a longitudinal groove; the eyes are large and but little convex. The thorax is truncated before and behind, but nearly of a spherical form; above it is thickly studded with glossy, rounded tubercles, and rather sparingly sprinkled with bright green scales. The elytra are very convex and of a short ovate form; the apex of each elytron is produced into a spine, which is evident to the naked eye, and there is a small hump at the suture at a short distance from the apex; the surface of the elytra is very rough, being broken up into rugæ and tubercules—the latter form longitudinal striæ. Bright green scales are as it were sprinkled on the elytra. The antennae have a slight pitchy hue, and so have the tibiae; the femora are red, but blackish at the extremity.

The specimen from which this description is taken is a female, and has the terminal segment of the abdomen conical and covered with rugae. The insect, which I suspect to be the male, differs in having the elytra narrower and rounded at the extremity, the rostrum rather coarsely punctured, and has three oblong furrows at the base.

Described from the Philippine Islands, without exact locality.

Specimens of three different species, which agree more or less in their characters with the above description, were forwarded to the British Museum for comparison with the types of the above species. Mr. Arrow kindly examined the material and reported as follows:

> As to *M. bispinosus* Waterh., the male and female specimens are probably different species and neither of them seems to agree with any of those sent by you for comparison.

Metapocyrtus (Trachycyrtus) confusus sp. nov. Plate 4, fig. 19, ♂, fig. 20, ♀ (lateral view).

Black; prothorax and elytra sparingly sprinkled with small pale greenish white scales. Related to *M. bispinosus* Waterhouse, but smaller. Rostrum coarsely and irregularly confluently punctured with an oblong medial depression in basal half and two indistinct longitudinal ridgelike swellings divergent toward apex. Basal transverse groove strongly pronounced. Front rugosely punctured with a fine medial groove. Prothorax subglobular, broader than long, coarsely and rather uniformly granulate, the granulations glossy, between them sparingly scattered scales. Elytra short and stout subovate, rugose and finely but irregularly glossy granulate, and sparingly sprinkled with scales. In both sexes basal margin near junction with lateral with a more or less pronounced glossy protuberance, usually more prominent in the female. Apical decline in the male uniformly sloping, elytra at apex rounded, female at apical sutural decline with a prominent bifid tubercle beset with short setæ, elytra at apex forming a prominent obtuse triangular projection. Apical region of elytra in both sexes with scattered fine whitish hair. Underside and legs sparsely whitish setose.

Male, length, 4.5 to 5 millimeters (without rostrum); width, 2.2 to 2.6. Female, length, 5 to 6 millimeters (without rostrum); width, 2.5 to 2.9.

BOHOL, Bilar (*Ramos; Duyag*).

This species was collected together with *M. adspersus* Waterhouse from the same plants.

Metapocyrtus (Trachycyrtus) spinipennis sp. nov. Plate 10, fig. 13, ♂, fig. 14, ♀ (lateral view).

Black; prothorax and elytra with rather sparingly scattered bright greenish scales, but on elytra the scales forming ill-defined transverse scale bands and two bare bands; femora reddish to castaneous brown, apically black, tibiæ piceous, tarsi black. Rostrum dorsally irregularly scatteredly punctured, with a broad but shallow depression toward base, the basal transverse groove strongly pronounced and continued at sides in front of eyes as a triangular depression. These lateral depressions contract the hinder dorsal part of rostrum, which appears on that account slightly humped or swollen, particularly in the female. Front scatteredly punctured and with a sharply defined medial groove. Prothorax subglobular, narrowly truncate anteriorly and broadly truncate at base, densely granulate, the granulations rather large, roundish, and glossy and between them irregularly scattered scales which are more numerous at sides. Prothorax in the male almost as broad as elytra, in the female narrower. Elytra short ovate, in the male rounded at apex, in the female each elytron at apex produced into a spine and at the beginning of apical decline with a well-pronounced oblong sutural protuberance beset with a small tuft of short setæ. Elytra coarsely irregularly striate-punctate, coarsely rugose and blunt subtuberculate, more or less densely beset with scattered greenish scales, except for two ill-defined bare bands before and behind the middle. Apical region beset with fine and short scattered hair, more pronounced in the female. Legs sparsely beset with fine whitish setæ, hind femora in the female not extending to apex of elytra, in the male reaching well beyond.

Male, length, 6.9 to 8 millimeters (without rostrum); width, 3 to 3.6. Female, length, 8.4 to 9 millimeters (without rostrum); width, 3.7 to 4.

BILIRAN, north of Leyte (*McGregor*).

Unfortunately, specimens of this species were not forwarded to the British Museum for comparison with *M. bispinosus* Waterhouse and there is a slight possibility that the female of *M. spinipennis* is identical with the female of *M. bispinosus;* but I am convinced that the male of the Waterhouse species is not identical with the male of *spinipennis,* particularly since that author says of the male: "the rostrum rather coarsely punctured, and has three oblong furrows at the base."

Metapocyrtus (Trachycyrtus) acutispinosus sp. nov. Plate 9, fig. 9, ♀ (lateral view).

Black, with scattered greenish golden scales, legs reddish brown except femora and tibiæ apically and tarsi which are black. Related to *M. spinipennis* sp. nov. Female, rostrum dorsally irregularly coarsely punctured, toward base gradually swollen, forming a small hump distinctly set off by the deep and broad basal transverse groove which forms laterally in front of eyes pitlike depressions which contract the basal upper part of rostrum. Front scatteredly punctured with a fine medial groove and a few scales. Prothorax subglobular, densely glossy, roundish granulate, the granulation larger and more flattish than in *M. spinipennis,* with an indistinct medial groove and sparsely scattered scales, the latter more densely congregated along anterior margin (forming an irregular band) and at sides. Elytra short ovate, irregularly striate-punctate and only near base subsuturally very finely and irregularly acutely subtuberculate. At the beginning of apical decline a small roundish protuberance beset with a small tuft of yellowish setæ. Each elytron at apex produced into an acute spine, the spines about the same length as in *M. spinipennis* but stouter and farther apart than in that species, their outer margins parallel. Elytra with very sparsely scattered scales except an irregular transverse scale band at base and in the middle, and the apical area densely beset with greenish golden scales.

Female, length, 8 to 9 millimeters (without rostrum); width, 3.5 to 3.8.

SAMAR, Wright (*McGregor*).

Metapocyrtus (Trachycyrtus) crassispinosus sp. nov. Plate 10, fig. 21, ♂, fig. 22, ♀ (lateral view).

Black; prothorax and elytra with sparingly scattered bright greenish scales which form ill-defined and indistinct transverse bands on prothorax and elytra; legs uniformly black. Related to *M. spinipennis* sp. nov. Rostrum shorter than in that species, scatteredly punctured, dorsally toward base slightly swollen and with a dimplelike medial depression, the basal transverse groove broad and confluent laterally, in front of eye with a small and deep irregular depression. Front with a few scattered punctures and a medial groove. Prothorax subglobular, densely but slightly irregularly glossy granulate, with sparsely scattered scales at sides reaching upward along anterior margin and forming a very indistinct transverse band near base. Elytra subovate, slenderer than in *M. spinipennis,* in the male rounded at apex, in the female each elytron terminating in a rather large acute spine. The spines are broad and strongly swollen at their base and are subconnate for two-thirds of their length, only the apical third divergent. At the beginning of apical decline of elytra in the female a prominent but more-roundish sutural bifid protuberance beset with short setæ. Elytra in both sexes very coarsely irregularly punctate and rugose, also indistinctly subtuberculate, with scattered scales except an indistinct antemedial and postmedial transverse bare band. Legs sparsely whitish setose.

Male, length, 6 millimeters (without rostrum); width, 2.3. Female, length, 7 to 7.4 millimeters (without rostrum); width, 3.1 to 3.4.

MINDANAO, Surigao Province, Surigao (*Schultze*).

This species is readily distinguished from *M. spinipennis* by its relatively slenderer form, and from that and other related species by the entirely differently shaped apical spines of elytra.

Metapocyrtus (Trachycyrtus) microspinosus sp. nov. Plate 10, fig. 17, ♂, fig. 18, ♀ (lateral view).

Black; prothorax and elytra with sparsely scattered greenish white scales which are more strongly pronounced than in *M. macrospinosus* sp. nov., but less pronounced than in *M. spinipennis* sp. nov. Rostrum densely and irregularly punctured, very sparsely beset with transversely directed fine whitish hair; dorsally in basal half with a rather deep dimplelike medial depression; rostrum basally slightly swollen, the basal transverse groove strongly pronounced and confluent in front of eye with an irregular triangular depression. Front sparsely punctured with a sharply defined medial groove. Prothorax subglobular, in the male almost as broad as elytra, densely and coarsely but slightly irregularly glossy granulate. Between the granulations scattered greenish white scales which are more numerous toward and at lateral margins. Elytra subovate, coarsely, confusedly rugosely striate-punctate and indistinctly subtuberculate, irregularly scattered with greenish white scales which are more numerous toward lateral margins. Elytra of the male rounded at apex; each elytron in the female terminating in a short and broad but acutely pointed spine, suture in the female at the beginning of apical decline indistinctly swollen and beset with a small oblong tuft of whitish setæ. Apical region in both sexes beset with scattered fine whitish hair, more pronounced in the female. Underside and legs sparsely whitish setose.

Male, length, 7 to 7.6 millimeters (without rostrum); width, 3 to 3.3. Female, length, 8 to 9 millimeters (without rostrum); width, 3.5 to 4.

BUCAS GRANDE, near Mindanao (*Schultze; Boettcher*).

Metapocyrtus (Trachycyrtus) macrospinosus sp. nov. Plate 10, fig. 15, ♂, fig. 16, ♀ (lateral view).

Black; prothorax at sides and elytra with sparsely scattered greenish white scales. Rostrum in the male slightly longer than in the female, dorsally in both sexes irregularly densely punctured with an oblong medial depression in basal half. The dorsolateral margins of rostrum uniformly rounded, more coarsely and confluently punctured, the deep basal transverse groove continued to base of antennal scrobe. Front scatteredly punctured with a sharply defined medial groove. Prothorax as long as broad, subglobular, densely and uniformly granulate, the granulations smaller than in *M. spinipennis* sp. nov., at lateral margins sparingly scattered with greenish white scales. Elytra ovate, coarsely rugosely and subtuberculately striate-punctate, with sparsely scattered greenish white scales. In both sexes some scattered fine short white hair in apical region. Elytra of male rounded at apex, each elytron in the female produced into a long horizontal spine, the spines for two-thirds of their length subconnate, only apical third slightly divergent; a short distance above spines the suture indistinctly swollen and beset with an elongate tuft of short white setæ. Legs sparsely beset with white setæ.

Male, length, 8.2 millimeters (without rostrum); width, 3.4. Female, length, 8.9 to 10 millimeters (without rostrum); width, 3.6 to 4.

LUZON, Camarines Norte Province, Paracale (*Schultze*).

The following three new species were recognized too late to be included in their proper places.

Metapocyrtus (Metapocyrtus) monticola sp. nov. Plate 7, fig. 19, ♂ (lateral view).

Black, with pale green scale markings. Related, and in sculpture and form similar, to *M. pilositibialis* sp. nov. Rostrum more finely rugosely punctured with a very indistinct medial depression and two divergent ridges. Front also slightly depressed and beset with a large scale patch. Prothorax subglobular, but less strongly pronounced than in *pilositibialis;* uniformly and moderately coarsely subrugosely punctured with a well-defined medial groove. Dorsolaterally in the middle an oval scale spot and an irregular spot at the lateral margins. Elytra subovate, irregularly and confusedly striate-punctate. Each elytron with eight oval or roundish scale spots located as follows: Two oval spots at base; two form a cross row at the middle; one oblong oval spot at lateral margin slightly behind the middle; and three smaller spots at apical third. Mesosternum, metasternum, and first abdominal sternite in the middle with a dense patch of pale brownish hair. Legs sparsely setose, anterior tibiæ with a few blunt teeth.

Male, length, 9.3 millimeters (without rostrum); width, 4.

LUZON, Rizal Province, mountains near Montalban (*A. Loher*).

Metapocyrtus (Metapocyrtus) tapulaonus sp. nov.

Related to *M. gregarius* sp. nov., but distinguished from the latter by the different form and sculpture of the prothorax and elytra. Black, legs red, except apical part of femora and tibiæ, tarsi also black. Rostrum densely rugosely punctured with a shallow elongate medial depression; lateral margins below dorsolateral edge in front of eye with a pitlike depression confluent with antennal scrobe. Front indistinctly rugosely punctured, with a sharply defined medial groove. Prothorax in the male slightly longer than broad, in the female as long as broad, densely and rather regularly glossy roundish granulate, minutely fine whitish hair arising between the granulations and with an indistinct medial groovelike depression, the latter more pronounced in the male. Prothorax in the male dorsally in anterior half strongly humplike inflated, very similar as in *M. magnigibbicollis* sp. nov. (Plate 6, figs. 9 and 10; Plate 12, figs. 60 and 61); in the female this characteristic is less pronounced. Elytra subovate, in male more elongate and broadly rounded at apex, in female stouter in form and more tapering toward apex. In both sexes each elytron with nine rather strongly impressed longitudinal puncture rows, the intervals between them forming slightly raised ridges. Some smaller scattered punctures also on the intervals. Each puncture with a fine and short white hair. Female, elytra laterally near base with three or four small tubercles. Underside and legs sparsely whitish setose. Last abdominal sternite rugosely punctured; in the female with a broad depression apically.

Male, length, 6.5 to 9.8 millimeters (without rostrum); width, 2.9 to 4. Female, length, 7.2 to 10 millimeters (without rostrum); width, 3.2 to 4.2.

LUZON, Zambales Province, Mount Tapulao, about 2,000 meters, in the pine region (*Duyag*).

My collector obtained a good series of specimens of this characteristic species recently (December, 1924). Aside from the rather great variation in size among the sixteen specimens, three have the legs entirely black, and in several specimens a few scattered whitish scales are present toward the lateral margin of the elytra.

Metapocyrtus (Trachycyrtus) zambalensis sp. nov.

Related and similar in size and form to *M. germari* Waterhouse, but at once distinguished from it as well as from any other species of this subgenus by the general color. Head, prothorax, and underside black; antennæ, elytra, and legs red to reddish brown. Rostrum dorsally subgranulately punctured, sparsely beset with fine whitish hair, in the female two indistinct divergent longitudinal ridges and a slight medial depression. Front with a sharply defined medial groove, some scattered fine hair, and a few blue scales. Prothorax rather coarsely and uniformly glossy roundish granulate with moderately densely scattered blue scales and fine whitish hair between the granulations. Elytra short and stout subovate, red, irregularly subtuberculately punctured with a short golden hair arising from each puncture and sparsely scattered blue scales toward the lateral margins. Female, each elytron laterally near the base with two rather prominent and acute tubercles. Femora and tibiæ blackish at apex, claw joints of tarsi also black.

Male, length, 5.3 to 6 millimeters (without rostrum); width, 2.9 to 3.3. Female, length, 6.3 to 6.9 millimeters (without rostrum); width, 3.4 to 3.8.

LUZON, Zambales Province, Mount Tapulao, 2,000 meters (*Duyag*).

ILLUSTRATIONS

[Original drawings by W. Schultze. All figures in Plate 1 twice natural size.]

PLATE 1

FIG. 1. *Metapocyrtus* (*Orthocyrtus*) *quadrulifer* Waterhouse, female. Luzon, Laguna, Mount Banahao.

2. *Metapocyrtus* (*Orthocyrtus*) *boholensis* sp. nov., female. Bohol, Bilar.

3. *Metapocyrtus* (*Orthocyrtus*) *helleri* sp. nov., female. Luzon, Camarines Norte, Paracale.

4. *Metapocyrtus* (*Orthocyrtus*) *ostentator* Heller, female. Luzon, Laguna, Lilio.

5. *Metapocyrtus* (*Dolichocephalocyrtus*) *chloromaculatus* sp. nov., female. Panay, Capiz, Jamindan.

6. *Metapocyrtus* (*Dolichocephalocyrtus*) *ruficollis* Waterhouse, male. Mindanao, Bukidnon, Lindaban.

7. *Metapocyrtus* (*Metapocyrtus*) *virgatus* Heller, female. Panay, Capiz Province, Culasi.

8. *Metapocyrtus* (*Metapocyrtus*) *proteus* Heller, female. Luzon, Nueva Vizcaya, Imugan.

9. *Metapocyrtus* (*Metapocyrtus*) *derasus* Boheman, male. Luzon, Benguet, Mount Data.

10. *Metapocyrtus* (*Dolichocephalocyrtus*) *frosti* sp. nov., male. Samar, Catarman.

11. *Metapocyrtus* (*Orthocyrtus*) *bifoveatus* sp. nov., male. Negros, Occidental Negros, Fabrica.

12. *Metapocyrtus* (*Metapocyrtus*) *congestus* Schultze, female. Luzon, Benguet, Baguio.

13. *Metapocyrtus* (*Metapocyrtus*) *abbrevilineatus* sp. nov., female. Luzon, Sorsogon, Sorsogon.

14. *Metapocyrtus* (*Orthocyrtus*) *monstrosus* sp. nov., female. Luzon, Nueva Vizcaya, near Balete Pass.

15. *Metapocyrtus* (*Dolichocephalocyrtus*) *trifasciatus* sp. nov., male. Siargao Island.

16. *Metapocyrtus* (*Orthocyrtus*) *subquadrulifer* Waterhouse, male. Luzon, Laguna, Mount Banahao.

PLATE 2

FIG. 1. *Metapocyrtus* (*Artapocyrtus*) *bifasciatus* Waterhouse var. *butuanensis* nov., male. Mindanao, Agusan, Butuan.

2. *Metapocyrtus* (*Artapocyrtus*) *bifasciatus* Waterhouse var. *butuanensis* nov., female. Mindanao, Agusan, Butuan.

3. *Metapocyrtus* (*Artapocyrtus*) *violaceus* Schultze, male. Siargao Island.

FIG. 4. *Metapocyrtus* (*Artapocyrtus*) *violaceus* Schultze, female. Siargao Island.

5. *Metapocyrtus* (*Artapocyrtus*) *bucasanus* Schultze, male. Bucas Island.

6. *Metapocyrtus* (*Artapocyrtus*) *bucasanus* Schultze, female. Bucas Island.

7. *Metapocyrtus* (*Artapocyrtus*) *samarensis* sp. nov., male. Samar, Borongan.

8. *Metapocyrtus* (*Artapocyrtus*) *samarensis* sp. nov., female. Samar, Borongan.

9. *Metapocyrtus* (*Artapocyrtus*) *diffusisquamosus* sp. nov., male. Mindanao, Surigao, Surigao.

10. *Metapocyrtus* (*Artapocyrtus*) *diffusisquamosus* sp. nov., female. Mindanao, Surigao, Surigao.

11. *Metapocyrtus* (*Metapocyrtus*) *polilloensis* sp. nov., female. Polillo Island.

12. *Metapocyrtus* (*Metapocyrtus*) *polilloensis* sp. nov., male. Polillo Island.

13. *Metapocyrtus* (*Metapocyrtus*) *brevicollis* Chevrolat, female. Luzon, Nueva Ecija, Caraballo Mountains.

14. *Metapocyrtus* (*Metapocyrtus*) *brevicollis* Chevrolat, male. Luzon, Nueva Ecija, Caraballo Mountains.

15. *Metapocyrtus* (*Metapocyrtus*) *luzonensis* sp. nov., female. Luzon, Laguna, Paete.

16. *Metapocyrtus* (*Metapocyrtus*) *luzonensis* sp. nov., male. Luzon, Laguna, Paete.

17. *Metapocyrtus* (*Orthocyrtus*) *tumoridorsum* Chevrolat, female. Philippines.

18. *Metapocyrtus* (*Artapocyrtus*) *longipenis* sp. nov., var. *biliranensis* nov., female. Biliran Island.

19. *Metapocyrtus* (*Artapocyrtus*) *geniculatus* Waterhouse, male. Philippines.

20. *Metapocyrtus* (*Orthocyrtus*) *ilocanus* sp. nov., female. Luzon, Ilocos Norte, Burgos.

21. *Metapocyrtus* (*Metapocyrtus*) *impius* Erichson, male. Luzon, Laguna, Mount Banahao.

22. *Metapocyrtus* (*Metapocyrtus*) *impius* Erichson, female. Luzon, Laguna, Mount Banahao.

23. *Metapocyrtus* (*Metapocyrtus*) *gregarius* sp. nov., female. Luzon, Laguna, Paete.

24. *Metapocyrtus* (*Metapocyrtus*) *gregarius* sp. nov., male. Luzon, Laguna, Paete.

25. *Metapocyrtus* (*Metapocyrtus*) *macgregori* Heller, female. Calayan Island.

26. *Metapocyrtus* (*Metapocyrtus*) *macgregori* Heller, male. Calayan Island.

27. *Metapocyrtus* (*Metapocyrtus*) *batanensis* sp. nov., female. Batan Island.

28. *Metapocyrtus* (*Metapocyrtus*) *batanensis* sp. nov., male. Batan Island.

FIG. 29. *Metapocyrtus* (*Metapocyrtus*) *subgregarius* sp. nov., male. Polillo Island.

30. *Metapocyrtus* (*Metapocyrtus*) *subgregarius* sp. nov., female. Polillo Island.

PLATE 3

FIG. 1. *Metapocyrtus* (*Metapocyrtus*) *lumutanus* Schultze, male. Luzon, Rizal, Mount Lumutan.

2. *Metapocyrtus* (*Metapocyrtus*) *lumutanus* Schultze, female. Luzon, Rizal, Mount Lumutan.

3. *Metapocyrtus* (*Metapocyrtus*) *annulatus* Schultze, male. Luzon, Benguet, Mount Pulog.

4. *Metapocyrtus* (*Sphenomorphoidea*) *metallicus* Waterhouse var. *sphenomorphoides* Heller, male. Leyte, Palompon.

5. *Metapocyrtus* (*Orthocyrtus*) *caeruleonotatus* Waterhouse, male. Mindanao, Surigao, Iron Deposit.

6. *Metapocyrtus* (*Sphenomorphoidea*) *aureomaculatus* sp. nov., male. Mindanao, Surigao, Surigao.

7. *Metapocyrtus* (*Sphenomorphoidea*) *aureomaculatus* sp. nov., female. Mindanao, Surigao, Surigao.

8. *Metapocyrtus* (*Sphenomorphoidea*) *metallicus* Waterhouse, female. Biliran Island.

9. *Metapocyrtus* (*Sphenomorphoidea*) *transversarius* sp. nov., female. Bucas Island.

10. *Metapocyrtus* (*Metapocyrtus*) *chlamydatus* sp. nov., female. Mindanao, Zamboanga, Port Banga.

11. *Metapocyrtus* (*Artapocyrtus*) *quadriplagiatus* Roelofs var. *biplagiatus* var. nov., male. Luzon, Laguna, Paete.

12. *Metapocyrtus* (*Artapocyrtus*) *quadriplagiatus* Roelofs, female. Luzon, Laguna, Paete.

13. *Metapocyrtus* (*Artapocyrtus*) *sexmaculatus* Schultze, male. Catanduanes, Virac.

14. *Metapocyrtus* (*Artapocyrtus*) *sexmaculatus* Schultze, female. Catanduanes, Virac.

15. *Metapocyrtus* (*Artapocyrtus*) *octomaculatus* Schultze, male. Polillo Island.

16. *Metapocyrtus* (*Artapocyrtus*) *octomaculatus* Schultze, female. Polillo Island.

17. *Metapocyrtus* (*Sphenomorphoidea*) *laevicollis* Waterhouse, female. Samar, Catarman.

18. *Metapocyrtus* (*Artapocyrtus*) *pardalis* Heller, female. Mindanao, Agusan, Agusan River.

19. *Metapocyrtus* (*Metapocyrtus*) *similis* Schultze, female. Luzon, Rizal, Mount Lumutan.

20. *Metapocyrtus* (*Metapocyrtus*) *picticollis* Heller, female. Philippines.

21. *Metapocyrtus* (*Metapocyrtus*) *abbrevilineatus* sp. nov., female. Luzon, Sorsogon, Sorsogon.

22. *Metapocyrtus* (*Metapocyrtus*) *camarinensis* sp. nov., female. Luzon, Camarines Norte, Paracale.

FIG. 23. *Metapocyrtus* (*Metapocyrtus*) *sumptuosus* Schultze, male. Luzon, Ilocos Norte, Mount Palimlim.

24. *Metapocyrtus* (*Metapocyrtus*) *sumptuosus* Schultze, female. Luzon, Ilocos Norte, Mount Palimlim.

25. *Metapocyrtus* (*Dolichocephalocyrtus*) *figuratus* Heller, male. Catanduanes, Virac.

26. *Metapocyrtus* (*Dolichocephalocyrtus*) *figuratus* Heller, female. Catanduanes, Virac.

27. *Metapocyrtus* (*Dolichocephalocyrtus*) *chloromaculatus* sp. nov., male. Panay, Capiz, Jamindan.

28. *Metapocyrtus* (*Dolichocephalocyrtus*) *chloromaculatus* sp. nov., female. Panay, Capiz, Jamindan.

29. *Metapocyrtus* (*Metapocyrtus*) *niger* sp. nov., male. Polillo Island.

30. *Metapocyrtus* (*Metapocyrtus*) *niger* sp. nov., female. Polillo Island.

PLATE 4

FIG. 1. *Metapocyrtus* (*Orthocyrtus*) *helleri* sp. nov., female. Luzon, Camarines Norte, Paracale.

2. *Metapocyrtus* (*Orthocyrtus*) *schoenherri* Waterhouse, female. Mindanao, Surigao, Surigao.

3. *Metapocyrtus* (*Orthocyrtus*) *quadrulifer* Waterhouse, male. Luzon, Laguna, Lilio.

4. *Metapocyrtus* (*Metapocyrtus*) *proteus* Heller, female. Luzon, Nueva Vizcaya, Imugan.

5. *Metapocyrtus* (*Metapocyrtus*) *proteus* Heller, male. Luzon, Nueva Vizcaya, Imugan.

6. *Metapocyrtus* (*Orthocyrtus*) *moorei* Schultze, male. Mindanao, Lanao, Dansalan.

7. *Metapocyrtus* (*Orthocyrtus*) *moorei* Schultze, female. Mindanao, Lanao, Dansalan.

8. *Metapocyrtus* (*Metapocyrtus*) *panayensis* Schultze, male. Panay, Capiz, Mount Macosolon.

9. *Metapocyrtus* (*Metapocyrtus*) *panayensis* Schultze, female. Panay, Capiz, Mount Macosolon.

10. *Metapocyrtus* (*Trachycyrtus*) *apoensis* sp. nov., male. Mindanao, Davao, Mount Apo.

11. *Metapocyrtus* (*Trachycyrtus*) *apoensis* sp. nov., female. Mindanao, Davao, Mount Apo.

12. *Metapocyrtus* (*Trachycyrtus*) *smaragdinus* sp. nov., male. Luzon, Nueva Vizcaya, near Balete Pass.

13. *Metapocyrtus* (*Trachycyrtus*) *smaragdinus* sp. nov., female. Luzon, Nueva Vizcaya, Balete Pass.

14. *Metapocyrtus* (*Metapocyrtus*) *subdiffusus* sp. nov., male. Samar, Wright.

15. *Metapocyrtus* (*Metapocyrtus*) *subdiffusus* sp. nov., female. Samar, Wright.

16. *Metapocyrtus* (*Orthocyrtus*) *virens* Heller, female. Philippines.

17. *Metapocyrtus* (*Orthocyrtus*) *subquadrulifer* Waterhouse, female. Luzon, Laguna, Mount Banahao.

FIG. 18. *Metapocyrtus* (*Metapocyrtus*) *pseudomandarinus* Heller, female. Luzon, Nueva Vizcaya, Imugan.

19. *Metapocyrtus* (*Trachycyrtus*) *confusus* sp. nov., male. Bohol, Bilar.

20. *Metapocyrtus* (*Trachycyrtus*) *confusus* sp. nov., female. Bohol, Bilar.

21. *Metapocyrtus* (*Trachycyrtus*) *tawiensis* sp. nov., male. Jolo, Mount Dajo.

22. *Metapocyrtus* (*Trachycyrtus*) *tawiensis* sp. nov., female. Bungao, near Tawitawi.

23. *Metapocyrtus* (*Orthocyrtus*) *lanusinus* Schultze, female. Mindanao, Bukidnon, Lindaban.

24. *Metapocyrtus* (*Orthocyrtus*) *lanusinus* Schultze, male. Mindanao, Bukidnon, Lindaban.

25. *Metapocyrtus* (*Orthocyrtus*) *insulanus* Schultze, female. Siargao Island.

26. *Metapocyrtus* (*Orthocyrtus*) *ornatus* Schultze, male. Bucas Island.

27. *Metapocyrtus* (*Orthocyrtus*) *ornatus* Schultze, female. Bucas Island.

28. *Metapocyrtus* (*Orthocyrtus*) *propolitus* Schultze, male. Luzon, Bontoc.

29. *Metapocyrtus* (*Orthocyrtus*) *propolitus* Schultze, female. Luzon.

30. *Metapocyrtus* (*Metapocyrtus*) *lindabonus* Schultze, male. Mindanao, Bukidnon, Lindaban.

31. *Metapocyrtus* (*Metapocyrtus*) *lindabonus* Schultze, female. Mindanao, Lindaban.

PLATE 5

FIG. 1. *Metapocyrtus* (*Metapocyrtus*) *elegans* Waterhouse, male. Luzon, Laguna, Lilio.

2. *Metapocyrtus* (*Metapocyrtus*) *elegans* Waterhouse, female. Luzon, Laguna, Lilio.

3. *Metapocyrtus* (*Metapocyrtus*) *mindorensis* sp. nov., male. Mindoro, Mount Calavite.

4. *Metapocyrtus* (*Metapocyrtus*) *mindorensis* sp. nov., female. Mindoro, Mount Calavite.

5. *Metapocyrtus* (*Metapocyrtus*) *rugicollis* Chevrolat, male. Luzon, Laguna, Lilio.

6. *Metapocyrtus* (*Metapocyrtus*) *rugicollis* Chevrolat, female. Luzon, Tayabas, Malinao.

7. *Metapocyrtus* (*Metapocyrtus*) *acutipennis* Waterhouse, male. Mindoro, Mount Calavite.

8. *Metapocyrtus* (*Metapocyrtus*) *acutipennis* Waterhouse, female. Mindoro, Mount Calavite.

9. *Metapocyrtus* (*Metapocyrtus*) *picipennis* Waterhouse, male. Luzon, Cagayan, Pamplona.

10. *Metapocyrtus* (*Metapocyrtus*) *picipennis* Waterhouse, female. Luzon, Cagayan, Pamplona.

11. *Metapocyrtus* (*Metapocyrtus*) *elegans* subsp. *phenax* Heller, male. Polillo Island.

FIG. 12. *Metapocyrtus* (*Metapocyrtus*) *elegans* subsp. *phenax* Heller, female. Polillo Island.
13. *Metapocyrtus* (*Metapocyrtus*) *erichsoni* Chevrolat, male. Bohol, Sevilla.
14. *Metapocyrtus* (*Metapocyrtus*) *erichsoni* Chevrolat, female. Bohol, Sevilla.
15. *Metapocyrtus* (*Metapocyrtus*) *subfasciatus* Waterhouse, male. Leyte, Cabalian.
16. *Metapocyrtus* (*Metapocyrtus*) *subfasciatus* Waterhouse, female. Leyte, Cabalian.
17. *Metapocyrtus* (*Orthocyrtus*) *ostentator* Heller, male. Luzon, Laguna, Lilio.
18. *Metapocyrtus* (*Orthocyrtus*) *ostentator* Heller, female. Luzon, Laguna, Lilio.
19. *Metapocyrtus* (*Orthocyrtus*) *lenis* Chevrolat, male. Philippines.
20. *Metapocyrtus* (*Metapocyrtus*) *subfasciatus biliranensis* var. *catarmanensis* nov., female. Samar, Catarman.
21. *Metapocyrtus* (*Metapocyrtus*) *subfasciatus* Waterhouse subsp. *biliranensis* subsp. nov., male. Biliran Island.
22. *Metapocyrtus* (*Metapocyrtus*) *subfasciatus* Waterhouse subsp. *biliranensis* subsp. nov., female. Biliran Island.
23. *Metapocyrtus* (*Metapocyrtus*) *difficilis* Heller, male. Luzon, Camarines Norte, Paracale.
24. *Metapocyrtus* (*Metapocyrtus*) *difficilis* Heller, female. Luzon, Camarines Norte, Paracale.
25. *Metapocyrtus* (*Metapocyrtus*) *reyesi* sp. nov., male. Negros, Occidental Negros, Fabrica.
26. *Metapocyrtus* (*Metapocyrtus*) *reyesi* sp. nov., female. Negros, Occidental Negros, Fabrica.
27. *Metapocyrtus* (*Metapocyrtus*) *visayaensis* sp. nov., male. Panay, Capiz, Calivo.
28. *Metapocyrtus* (*Metapocyrtus*) *visayaensis* sp. nov., female. Panay, Capiz, Calivo.
29. *Metapocyrtus* (*Metapocyrtus*) *elongatus* sp. nov., male. Occidental Negros, Faraon.
30. *Metapocyrtus* (*Metapocyrtus*) *bukidnonensis* sp. nov., female. Mindanao, Bukidnon, Lindaban.

PLATE 6

FIG. 1. *Metapocyrtus* (*Trachycyrtus*) *socius* subsp. *calivoensis* nov., male. Panay, Capiz, Calivo.
2. *Metapocyrtus* (*Trachycyrtus*) *socius* subsp. *calivoensis* nov., female. Panay, Capiz, Calivo.
3. *Metapocyrtus* (*Metapocyrtus*) *bifoveatus* sp. nov., male. Negros, Occidental Negros, Fabrica.
4. *Metapocyrtus* (*Metapocyrtus*) *bifoveatus* sp. nov., female. Negros, Occidental Negros, Fabrica.
5. *Metapocyrtus* (*Orthocyrtus*) *consobrinus* Schultze, male. Mindanao, Surigao, Taganito.
6. *Metapocyrtus* (*Orthocyrtus*) *consobrinus* Schultze, female. Mindanao, Surigao, Taganito.

FIG. 7. *Metapocyrtus* (*Metapocyrtus*) *gibbirostris* Waterhouse, male. Bohol, Bilar.

8. *Metapocyrtus* (*Metapocyrtus*) *gibbirostris* Waterhouse, female. Bohol, Bilar.

9. *Metapocyrtus* (*Metapocyrtus*) *magnigibbicollis* sp. nov., male. Negros, Cuernos Mountains.

10. *Metapocyrtus* (*Metapocyrtus*) *magnigibbicollis* sp. nov., female. Negros, Cuernos Mountains.

11. *Metapocyrtus* (*Orthocyrtus*) *triangularis* Heller, female. Dalupiri Island, Babuyanes.

12. *Metapocyrtus* (*Artapocyrtus*) *humeralis* Heller, male. Philippines.

13. *Metapocyrtus* (*Artapocrtus*) *humeralis* Heller, female. Philippines.

14. *Metapocyrtus* (*Metapocyrtus*) *congestus* Schultze, male. Luzon, Benguet, Mount Santo Tomas.

15. *Metapocyrtus* (*Metapocyrtus*) *congestus* Schultze, female. Luzon, Benguet, Mount Santo Tomas.

16. *Metapocyrtus* (*Metapocyrtus*) *whiteheadi* sp. nov., male. Northeastern Luzon.

17. *Metapocyrtus* (*Metapocyrtus*) *whiteheadi* sp. nov., female. Northeastern Luzon.

18. *Metapocyrtus* (*Orthocyrtus*) *boholensis* sp. nov., male. Bohol, Bilar.

19. *Metapocyrtus* (*Orthocyrtus*) *boholensis* sp. nov., female. Bohol, Bilar.

20. *Metapocyrtus* (*Orthocyrtus*) *boholensis* var. *semotus*, nov., male. Leyte, Cabalian.

21. *Metapocyrtus humeralis aureofasciatus* subsp. nov., female. Samar, Wright.

22. *Metapocyrtus humeralis aureofasciatus* subsp. nov., male. Philippines.

23. *Metapocyrtus* (*Artapocyrtus*) *longipenis* sp. nov., female. Bohol, Bilar.

24. *Metapocyrtus* (*Artapocyrtus*) *longipenis* sp. nov., male. Bohol, Bilar.

25. *Metapocyrtus* (*Metapocyrtus*) *imitatus* sp. nov., male. Bohol, Bilar.

26. *Metapocyrtus* (*Metapocyrtus*) *imitatus* sp. nov., female. Bohol, Bilar.

27. *Metapocyrtus* (*Sclerocyrtus*) *asper* Heller, male. Siargao Island.

28. *Metapocyrtus* (*Sclerocyrtus*) *asper* Heller, female. Siargao Island.

29. *Metapocyrtus* (*Trachycyrtus*) *joloensis* sp. nov., male. Jolo, Mount Dajo.

30. *Metapocyrtus* (*Trachycyrtus*) *joloensis* sp. nov., female. Jolo, Mount Dajo.

PLATE 7

FIG. 1. *Metapocyrtus* (*Metapocyrtus*) *interruptostriatus* Schultze, male. Luzon, Benguet, Mount Santo Tomas.

2. *Metapocyrtus* (*Metapocyrtus*) *interruptostriatus* Schultze, female. Luzon, Benguet, Mount Santo Tomas.

FIG. 3. *Metapocyrtus* (*Metapocyrtus*) *interruptolineatus* Heller, female. Luzon, Benguet, Atoc.

4. *Metapocyrtus* (*Metapocyrtus*) *pseudomonilifer* Heller, male. Luzon, Benguet.

5. *Metapocyrtus* (*Metapocyrtus*) *pseudomonilifer* Heller, female. Luzon, Benguet.

6. *Metapocyrtus* (*Metapocyrtus*) *politus* Heller, male. Luzon, Benguet, Mount Pauadan.

7. *Metapocyrtus* (*Metapocyrtus*) *politus* Heller, female. Luzon, Benguet, Mount Pauadan.

8. *Metapocyrtus* (*Metapocyrtus*) *perpulcheroides* Schultze, male. Luzon, Kalinga, Davangan.

9. *Metapocyrtus* (*Metapocyrtus*) *perpulcheroides* Schultze, female. Luzon, Kalinga, Davangan.

10. *Metapocyrtus* (*Trachycyrtus*) *banahaoensis* subsp. *davanganus* nov., female. Luzon, Kalinga, Davangan.

11. *Metapocyrtus* (*Trachycyrtus*) *rostrogibbosus* sp. nov., female. Luzon, Tayabas, Gumaca.

12. *Metapocyrtus* (*Metapocyrtus*) *striatus* Heller, male. Romblon Island.

13. *Metapocyrtus* (*Metapocyrtus*) *striatus* Heller, female. Romblon Island.

14. *Metaporcyrtus* (*Metapocyrtus*) *virgatus* Heller, female. Panay, Capiz, Culasi.

15. *Metapocyrtus* (*Metapocyrtus*) *sibuyanensis* sp. nov., female. Sibuyan Island.

16. *Metapocyrtus* (*Trachycyrtus*) *profanus* var. *arayatensis* nov., male. Luzon, Pampanga, Mount Arayat.

17. *Metapocyrtus* (*Trachycyrtus*) *profanus* var. *arayatensis* nov., female. Luzon, Pampanga, Mount Arayat.

18. *Metapocyrtus* (*Metapocyrtus*) *worcesteri* sp. nov., female. Mindanao, Zamboanga, Zamboanga.

19. *Metapocyrtus* (*Metapocyrtus*) *monticola* sp. nov., male. Luzon, Rizal, Montalban.

20. *Metapocyrtus* (*Metapocyrtus*) *multisquamosus* Schultze, female. Siargao Island.

21. *Metapocyrtus* (*Metapocyrtus*) *pilositibialis* sp. nov., male. Negros, Mount Canlaon.

22. *Metapocyrtus* (*Metapocyrtus*) *interruptus* Heller, female. Luzon, Benguet, Baguio.

23. *Metapocyrtus* (*Metapocyrtus*) *subvirgatus* sp. nov., male. Panay, Capiz, Culasi.

24. *Metapocyrtus* (*Metapocyrtus*) *subvirgatus* sp. nov., female. Panay, Capiz, Culasi.

25. *Metapocyrtus* (*Metapocyrtus*) *derasus* Boheman, female. Luzon, Benguet, Baguio.

26. *Metapocyrtus* (*Metapocyrtus*) *derasus* Boheman, male. Luzon, Benguet, Mount Data.

27. *Metapocyrtus* (*Metapocyrtus*) *limayensis* sp. nov., male. Luzon, Bataan, Limay.

28. *Metapocyrtus* (*Metapocyrtus*) *limayensis* sp. nov., female. Luzon, Bataan, Limay.

FIG. 29. *Metapocyrtus* (*Metapocyrtus*) *politissimus* Heller, male. Luzon, Benguet, Mount Pulog.

30. *Metapocyrtus* (*Metapocyrtus*) *politissimus* Heller, female. Luzon, Benguet, Mount Pulog.

PLATE 8

FIG. 1. *Metapocyrtus* (*Dolichocephalocyrtus*) *trifasciatus* sp. nov., male. Siargao Island.

2. *Metapocyrtus* (*Dolichocephalocyrtus*) *trifasciatus* sp. nov., female. Siargao Island.

3. *Metapocyrtus* (*Dolichocephalocyrtus*) *lineaticollis* sp. nov., male. Mindanao, Lanao, Mumungan.

4. *Metapocyrtus* (*Dolichocephalocyrtus*) *lineaticollis* sp. nov., female. Mindanao, Lanao, Mumungan.

5. *Metapocyrtus* (*Dolichocephalocyrtus*) *bituberosus* Heller, male. Mindanao, Davao, Davao.

6. *Metapocyrtus* (*Dolichocephalocyrtus*) *bituberosus* Heller, female. Mindanao, Davao, Davao.

7. *Metapocyrtus* (*Dolichocephalocyrtus*) *bituberosus* Heller var. *davaoensis* nov., male. Mindanao, Davao, Davao.

8. *Metapocyrtus* (*Dolichocephalocyrtus*) *bituberosus* Heller var. *davaoensis* nov., female. Mindanao, Davao, Davao.

9. *Metapocyrtus* (*Dolichocephalocyrtus*) *dolosus* Heller, male. Mindanao, Surigao, Surigao.

10. *Metapocyrtus* (*Dolichocephalocyrtus*) *dolosus* Heller, female. Mindanao, Surigao, Surigao.

11. *Metapocyrtus* (*Dolichocephalocyrtus*) *bituberosus* Heller subsp. *samalensis* nov., male. Samal Island, Davao Gulf.

12. *Metapocyrtus* (*Dolichocephalocyrtus*) *bituberosus* Heller subsp. *samalensis* nov., female. Samal Island, Davao Gulf.

13. *Metapocyrtus* (*Dolichocephalocyrtus*) *pikitensis* sp. nov., male. Mindanao, Cotabato, Pikit.

14. *Metapocyrtus* (*Dolichocephalocyrtus*) *pikitensis* sp. nov., female. Mindanao, Cotabato, Pikit.

15. *Metapocyrtus* (*Dolichocephalocyrtus*) *frosti* sp. nov., male. Samar, Catarman.

16. *Metapocyrtus* (*Dolichocephalocyrtus*) *frosti* sp. nov., female. Samar, Catarman.

17. *Metapocyrtus* (*Dolichocephalocyrtus*) *ruficollis* Waterhouse, male. Mindanao, Bukidnon, Lindaban.

18. *Metapocyrtus* (*Dolichocephalocyrtus*) *ruficollis* Waterhouse, female. Mindanao, Bukidnon, Lindaban.

19. *Metapocyrtus* (*Dolichocephalocyrtus*) *negrosensis* sp. nov., male. Occidental Negros.

20. *Metapocyrtus* (*Dolichocephalocyrtus*) *negrosensis* sp. nov., female. Occidental Negros.

21. *Metapocyrtus* (*Dolichocephalocyrtus*) *clemensi* sp. nov., male. Mindanao, Davao, Mount Apo.

22. *Metapocyrtus* (*Dolichocephalocyrtus*) *clemensi* sp. nov., female. Mindanao, Davao, Mount Apo.

FIG. 23. *Metapocyrtus* (*Dolichocephalocyrtus*) *mindanaoensis* sp. nov., male. Mindanao, Cotabato, Saob.

24. *Metapocyrtus* (*Dolichocephalocyrtus*) *mindanaoensis* sp. nov., female. Mindanao, Cotabato, Saob.
25. *Metapocyrtus* (*Dolichocephalocyrtus*) *ticaoensis* sp. nov., male. Ticao Island.
26. *Metapocyrtus* (*Dolichocephalocyrtus*) *ticaoensis* sp. nov., female. Ticao Island.
27. *Metapocyrtus* (*Dolichocephalocyrtus*) *subdolosus* sp. nov., male. Mindanao, Agusan, Butuan.
28. *Metapocyrtus* (*Dolichocephalocyrtus*) *subdolosus* sp. nov., female. Mindanao, Agusan, Butuan.
29. *Metapocyrtus* (*Dolichocephalocyrtus*) *univerrucosus* sp. nov., male. Polillo Island.
30. *Metapocyrtus* (*Dolichocephalocyrtus*) *univerrucosus* sp. nov., female. Polillo Island.

PLATE 9

FIG. 1. *Metapocyrtus* (*Trachycyrtus*) *socius* sp. nov., male. Negros, Occidental Negros, Fabrica.

2. *Metapocyrtus* (*Trachycyrtus*) *socius* sp. nov., female. Negros, Occidental Negros, Fabrica.
3. *Metapocyrtus* (*Metapocyrtus*) *vestitus* sp. nov., male. Sibuyan Island.
4. *Metapocyrtus* (*Trachycyrtus*) *vestitus* sp. nov., female. Sibuyan Island.
5. *Metapocyrtus* (*Trachycyrtus*) *viridans* sp. nov., male. Luzon, Rizal, Mount Lumutan.
6. *Metapocyrtus* (*Trachycyrtus*) *viridans* sp. nov., female. Luzon, Rizal, Mount Lumutan.
7. *Metapocyrtus* (*Trachycyrtus*) *pseudoviridans* sp. nov., male. Luzon, Rizal, Mount Lumutan.
8. *Metapocyrtus* (*Trachycyrtus*) *pseudoviridans* sp. nov., female. Luzon, Rizal, Mount Lumutan.
9. *Metapocyrtus* (*Trachycyrtus*) *acutispinosus* sp. nov., female. Samar, Wright.
10. *Metapocyrtus* (*Metapocyrtus*) *tenuipes* Heller, female. Luzon.
11. *Metapocyrtus* (*Metapocyrtus*) *atocanus* Schultze, male. Luzon, Benguet, Atoc.
12. *Metapocyrtus* (*Metapocyrtus*) *atocanus* Schultze, female. Luzon, Benguet, Atoc.
13. *Metapocyrtus* (*Metapocyrtus*) *cylas* Heller, male. Luzon, Benguet, Haight's Place.
14. *Metapocyrtus* (*Metapocyrtus*) *cylas* Heller, female. Luzon, Benguet, Haight's Place.
15. *Metapocyrtus* (*Trachycyrtus*) *immeritus* Boheman, male. Dalupiri Island.
16. *Metapocyrtus* (*Trachycyrtus*) *immeritus* Boheman. Dalupiri Island.
17. *Metapocyrtus* (*Dolichocephalocyrtus*) *elicanoi* sp. nov., male. Batan, Albay.

FIG. 18. *Metapocyrtus* (*Dolichocephalocyrtus*) *elicanoi* sp. nov., female. Batan, Albay.

19. *Metapocyrtus* (*Metapocyrtus*) *sphaericollis* sp. nov., male. Luzon, Benguet, Mount Santo Tomas.
20. *Metapocyrtus* (*Metapocyrtus*) *sphaericollis* sp. nov., female. Luzon, Benguet, Mount Santo Tomas.
21. *Metapocyrtus* (*Metapocyrtus*) *rufotibialis* Heller, male. Luzon, Benguet, Baguio.
22. *Metapocyrtus* (*Metapocyrtus*) *rufotibialis* Heller, female. Luzon, Benguet, Baguio.
23. *Metapocyrtus* (*Metapocyrtus*) *mandarinus* Heller, male. Luzon, Benguet, Baguio.
24. *Metapocyrtus* (*Metapocyrtus*) *mandarinus* Heller, female. Luzon, Benguet, Baguio.
25. *Metapocyrtus* (*Trachycyrtus*) *turgidofemoralis* sp. nov., male. Luzon, Laguna, Mount Banahao.
26. *Metapocyrtus* (*Trachycyrtus*) *turgidofemoralis* sp. nov., female. Luzon, Laguna, Mount Banahao.
27. *Metapocyrtus* (*Metapocyrtus*) *scabiosus* Heller, male. Luzon, Benguet, Mount Santo Tomas.
28. *Metapocyrtus* (*Metapocyrtus*) *scabiosus* Heller, female. Luzon, Benguet, Mount Santo Tomas.
29. *Metapocyrtus* (*Trachycyrtus*) *sabtangensis* sp. nov., male. Sabtang Island, Batanes Islands.
30. *Metapocyrtus* (*Trachycyrtus*) *sabtangensis* sp. nov., female. Sabtang Island, Batanes Islands.

PLATE 10

FIG. 1. *Metapocyrtus* (*Trachycyrtus*) *sparsus* Faust, male. Luzon, Benguet, Baguio.

2. *Metapocyrtus* (*Trachycyrtus*) *sparsus* Faust, female. Luzon, Benguet, Baguio.
3. *Metapocyrtus* (*Trachycyrtus*) *banahaoensis* sp. nov., male. Luzon, Laguna, Paete.
4. *Metapocyrtus* (*Trachycyrtus*) *banahaoensis* sp. nov., female. Luzon, Laguna, Paete.
5. *Metapocyrtus* (*Trachycyrtus*) *banguiensis* sp. nov., male. Luzon, Ilocos Norte, Bangui.
6. *Metapocyrtus* (*Trachycyrtus*) *germari* Waterhouse, female. Luzon, Ilocos Norte, Bangui.
7. *Metapocyrtus* (*Trachycyrtus*) *calavitenis* sp. nov., male. Mindoro, Mount Calavite.
8. *Metapocyrtus* (*Trachycyrtus*) *calavitenis* sp. nov., female. Mindoro, Mount Calavite.
9. *Metapocyrtus* (*Trachycyrtus*) *palawanensis* sp. nov., male. Palawan, Iwahig.
10. *Metapocyrtus* (*Trachycyrtus*) *palawanensis* sp. nov., female. Palawan, Iwahig.
11. *Metapocyrtus* (*Metapocyrtus*) *furcatus* Schultze, male. Luzon, Benguet, Baguio.

FIG. 12. *Metapocyrtus* (*Metapocyrtus*) *furcatus* Schultze, female. Luzon, Benguet, Baguio.

13. *Metapocyrtus* (*Trachycyrtus*) *spinipennis* sp. nov., male. Biliran Island.

14. *Metapocyrtus* (*Trachycyrtus*) *spinipennis* sp. nov., female. Biliran Island.

15. *Metapocyrtus* (*Trachycyrtus*) *macrospinosus* sp. nov., male. Luzon, Camarines Norte, Paracale.

16. *Metapocyrtus* (*Trachycyrtus*) *macrospinosus* sp. nov., female. Luzon, Camarines Norte, Paracale.

17. *Metapocyrtus* (*Trachycyrtus*) *microspinosus* sp. nov., male. Bucas Grande Island.

18. *Metapocyrtus* (*Trachycyrtus*) *microspinosus* sp. nov., female. Bucas Grande Island.

19. *Metapocyrtus* (*Trachycyrtus*) *nanus* Boheman, male. Negros, Occidental Negros, Maao.

20. *Metapocyrtus* (*trachycyrtus*) *nanus* Boheman, female. Negros, Occidental Negros, Maao.

21. *Metapocyrtus* (*Trachycyrtus*) *crassispinosus* sp. nov., male. Mindanao, Surigao, Surigao.

22. *Metapocyrtus* (*Trachycyrtus*) *crassispinosus* sp. nov., female. Mindanao, Surigao, Surigao.

23. *Metapocyrtus* (*Trachycyrtus*) *concinnus* Waterhouse, male. Negros, Occidental Negros, Fabrica.

24. *Metapocyrtus* (*Trachycyrtus*) *concinnus* Waterhouse, female. Negros, Occidental Negros, Fabrica.

25. *Metapocyrtus* (*Metapocyrtus*) *repandicauda* Heller, male. Luzon, Benguet, Mount Santo Tomas.

26. *Metapocyrtus* (*Metapocyrtus*) *repandicauda* Heller, female. Luzon, Benguet, Mount Santo Tomas.

27. *Metapocyrtus* (*Trachycyrtus*) *spinipes* Chevrolat, male. Luzon, Rizal, Bosoboso.

28. *Metapocyrtus* (*Trachycyrtus*) *spinipes* Chevrolat, female. Luzon, Rizal, Bosoboso.

29. *Metapocyrtus* (*Trachycyrtus*) *sibayensis* sp. nov., male. Sibay Island (south of Mindoro).

30. *Metapocyrtus* (*Trachycyrtus*) *sibayensis* sp. nov., female. Sibay Island (south of Mindoro).

31. *Metapocyrtus* (*Trachycyrtus*) *chevrolati* Waterhouse, male. Luzon, Ilocos Norte, Mount Palimlim.

32. *Metapocyrtus* (*Trachycyrtus*) *chevrolati* Waterhouse, female. Luzon, Ilocos Norte, Mount Palimlim.

33. *Metapocyrtus* (*Trachycyrtus*) *lagunaensis* sp. nov., male. Luzon, Laguna, Paete.

34. *Metapocyrtus* (*Trachycyrtus*) *lagunaensis* sp. nov., female. Luzon, Laguna, Paete.

35. *Metapocyrtus* (*Trachycyrtus*) *adspersus* Waterhouse, male. Samar, Wright.

36. *Metapocyrtus* (*Trachycyrtus*) *adspersus* Waterhouse, female. Bohol, Bilar.

FIG. 37. *Metapocyrtus* (*Trachycyrtus*) *pulverulentus* Waterhouse, male. Luzon, Tayabas, Laguimanoc.

38. *Metapocyrtus* (*Trachycyrtus*) *pulverulentus* Waterhouse, female. Luzon, Tayabas, Laguimanoc.

39. *Metapocyrtus* (*Trachycyrtus*) *palawanensis* subsp. *acutituberculatus* nov., male. Busuanga Island.

40. *Metapocyrtus* (*Trachycyrtus*) *palawanensis* subsp. *acutituberculatus* nov., female. Busuanga Island.

PLATE 11

FIG. 1. *Metapocyrtus* (*Metapocyrtus*) *schicki* sp. nov., male. Luzon, Nueva Vizcaya, Santa Fe.

2. *Metapocyrtus* (*Metapocyrtus*) *schicki* sp. nov., female. Luzon, Nueva Vizcaya, Santa Fe.

3. *Metapocyrtus* (*Metapocyrtus*) *caeruleomaculatus* sp. nov., male. Luzon, Nueva Vizcaya, Santa Fe.

4. *Metapocyrtus* (*Metapocyrtus*) *caeruleomaculatus* sp. nov., female. Luzon, Nueva Vizcaya, Santa Fe.

5. *Metapocyrtus* (*Metapocyrtus*) *lepantoensis* sp. nov., male. Luzon, Benguet, Suyoc.

6. *Metapocyrtus* (*Metapocyrtus*) *lepantoensis* sp. nov., female. Luzon, Benguet, Suyoc.

7. *Metapocyrtus* (*Trachycyrtus*) *gibbicollis* Faust, male. Luzon, Benguet, Baguio.

8. *Metapocyrtus* (*Trachycyrtus*) *gibbicollis* Faust, female. Luzon, Benguet, Baguio.

9. *Metapocyrtus* (*Trachycyrtus*) *miser* Faust, male. Luzon, Benguet, Baguio.

10. *Metapocyrtus* (*Trachycyrtus*) *miser* Faust, female. Luzon, Benguet, Baguio.

11. *Metapocyrtus* (*Orthocyrtus*) *pretiosus* Schultze. male. Luzon, Ilocos Norte, Mount Palimlim.

12. *Metapocyrtus* (*Orthocyrtus*) *pretiosus* Schultze, female. Luzon, Ilocos Norte, Mount Palimlim.

13. *Metapocyrtus* (*Orthocyrtus*) *monstrosus* sp. nov., female. Luzon, Nueva Vizcaya, near Balete Pass.

14. *Metapocyrtus* (*Artapocyrtus*) *derasocobaltinus* Heller, male. Samar, Wright.

15. *Metapocyrtus* (*Artapocyrtus*) *derasocobaltinus* Heller, female. Samar, Wright.

16. *Metapocyrtus* (*Dolichocephalocyrtus*) *emarginaticollis* sp. nov., male. Samar, Wright.

17. *Metapocyrtus* (*Dolichocephalocyrtus*) *emarginaticollis* sp. nov., female. Samar, Wright.

18. *Metapocyrtus* (*Metapocyrtus*) *subfasciatus* subsp. *variabilis* nov., male. Samar, Wright.

19. *Metapocyrtus* (*Metapocyrtus*) *subfasciatus* subsp. *variabilis* nov., female. Samar, Wright.

20. *Metapocyrtus* (*Sclerocyrtus*) *celestinoi* sp. nov., male. Samar, Wright.

FIG. 21. *Metapocyrtus* (*Metapocyrtus*) *pilosus* sp. nov., male. Luzon, Nueva Vizcaya, Balete Pass.

22. *Metapocyrtus* (*Metapocyrtus*) *pilosus* sp. nov., female. Luzon, Nueva Vizcaya, Balete Pass.

23. *Metapocyrtus* (*Dolichocephalocyrtus*) *bambalio* Heller, male. Luzon, Benguet, Irisan.

24. *Metapocyrtus* (*Dolichocephalocyrtus*) *bambalio* Heller, female. Luzon, Benguet, Irisan.

25. *Metapocyrtus* (*Metapocyrtus*) *adaptatus* sp. nov., male. Mindanao, Surigao, Surigao.

26. *Metapocyrtus* (*Metapocyrtus*) *adaptatus* sp. nov., female. Mindanao, Surigao, Surigao.

27. *Metapocyrtus* (*Sclerocyrtus*) *chamissoi* sp. nov., male. Samar, Wright.

28. *Metapocyrtus* (*Sclerocyrtus*) *chamissoi* sp. nov., female. Samar, Wright.

29. *Metapocyrtus* (*Metapocyrtus*) *diffusus* sp. nov., male. Samar, Wright.

30. *Metapocyrtus* (*Metapocyrtus*) *diffusus* sp. nov., female. Samar, Wright.

PLATE 12

FIG. 1. *Metapocyrtus* (*Orthocyrtus*) *insulanus* Schultze.
2. *Metapocyrtus* (*Orthocyrtus*) *consobrinus* Schultze.
3. *Metapocyrtus* (*Metapocyrtus*) *picipennis* Waterhouse.
4. *Metapocyrtus* (*Metapocyrtus*) *elegans* subsp. *phenax* Heller.
5. *Metapocyrtus* (*Metapocyrtus*) *niger* sp. nov.
6. *Metapocyrtus* (*Metapocyrtus*) *polilloensis* sp. nov.
7. *Metapocyrtus* (*Dolichocephalocyrtus*) *figuratus* Heller.
8. *Metapocyrtus* (*Metapocyrtus*) *gibbirostris* Waterhouse.
9. *Metapocyrtus* (*Metapocyrtus*) *brevicollis* Chevrolat.
10. *Metapocyrtus* (*Metapocyrtus*) *reyesi* sp. nov.
11. *Metapocyrtus* (*Dolichocephalocyrtus*) *trifasciatus* sp. nov.
12. *Metapocyrtus* (*Metapocyrtus*) *erichsoni* Chevrolat.
13. *Metapocyrtus* (*Artapocyrtus*) *longipenis* sp. nov.
14. *Metapocyrtus* (*Sclerocyrtus*) *asper* Heller.
15. *Metapocyrtus* (*Artapocyrtus*) *samarensis* sp. nov.
16. *Metapocyrtus* (*Artapocyrtus*) *diffusisquamosus* sp. nov.
17. *Metapocyrtus* (*Artapocyrtus*) *violaceus* Schultze.
18. *Metapocyrtus* (*Orthocyrtus*) *ostentator* Heller.
19. *Metapocyrtus* (*Artapocyrtus*) *geniculatus* Waterhouse.
20. *Metapocyrtus* (*Metapocyrtus*) *gregarius* sp. nov.
21. *Metapocyrtus* (*Metapocyrtus*) *multisquamosus* Schultze.
22. *Metapocyrtus* (*Orthocyrtus*) *pretiosus* Schultze.
23. *Metapocyrtus* (*Sphenomorphoidea*) *transversarius* sp. nov.
24. *Metapocyrtus* (*Sphenomorphoidea*) *aureomaculatus* sp. nov.
25. *Metapocyrtus* (*Artapocyrtus*) *longipenis* sp. nov.
26. *Metapocyrtus* (*Artapocyrtus*) *longipenis* sp. nov.
27. *Metapocyrtus* (*Artapocyrtus*) *sexmaculatus* Schultze.
28. *Metapocyrtus* (*Artapocyrtus*) *sexmaculatus* Schultze.
29. *Metapocyrtus* (*Artapocyrtus*) *diffusisquamosus* sp. nov.
30. *Metapocyrtus* (*Artapocyrtus*) *diffusisquamosus* sp. nov.

FIG. 31. *Metapocyrtus* (*Artapocyrtus*) *samarensis* sp. nov.
32. *Metapocyrtus* (*Artapocyrtus*) *samarensis* sp. nov.
33. *Metapocyrtus* (*Artapocyrtus*) *octomaculatus* Schultze.
34. *Metapocyrtus* (*Artapocyrtus*) *octomaculatus* Schultze.
35. *Metapocyrtus* (*Sclerocyrtus*) *asper* Heller.
36. *Metapocyrtus* (*Sclerocyrtus*) *asper* Heller.
37. *Metapocyrtus* (*Sclerocyrtus*) *chamissoi* sp. nov.
38. *Metapocyrtus* (*Metapocyrtus*) *sumptuosus* Schultze.
39. *Metapocyrtus* (*Metapocyrtus*) *sumptuosus* Schultze.
40. *Metapocyrtus* (*Metapocyrtus*) *camarinensis* sp. nov.
41. *Metapocyrtus* (*Sphenomorphoidea*) *aureomaculatus* sp. nov.
42. *Metapocyrtus* (*Sphenomorphoidea*) *aureomaculatus* sp. nov.
43. *Metapocyrtus* (*Sphenomorphoidea*) *metallicus* Waterhouse.
44. *Metapocyrtus* (*Sphenomorphoidea*) *metallicus* Waterhouse.
45. *Metapocyrtus* (*Metapocyrtus*) *scabiosus* Heller.
46. *Metapocyrtus* (*Metapocyrtus*) *scabiosus* Heller.
47. *Metapocyrtus* (*Metapocyrtus*) *niger* sp. nov.
48. *Metapocyrtus* (*Metapocyrtus*) *niger* sp. nov.
49. *Metapocyrtus* (*Orthocyrtus*) *bifoveatus* sp. nov.
50. *Metapocyrtus* (*Orthocyrtus*) *triangularis* Heller.
51. *Metapocyrtus* (*Orthocyrtus*) *quadrulifer* Waterhouse.
52. *Metapocyrtus* (*Dolichocephalocyrtus*) *ruficollis* Waterhouse.
53. *Metapocyrtus* (*Dolichocephalocyrtus*) *ruficollis* Waterhouse.
54. *Metapocyrtus* (*Dolichocephalocyrtus*) *lineaticollis* sp. nov.
55. *Metapocyrtus* (*Dolichocephalocyrtus*) *lineaticollis* sp. nov.
56. *Metapocyrtus* (*Dolichocephalocyrtus*) *frosti* sp. nov.
57. *Metapocyrtus* (*Dolichocephalocyrtus*) *frosti* sp. nov.
58. *Metapocyrtus* (*Trachycyrtus*) *germari* Waterhouse.
59. *Metapocyrtus* (*Trachycyrtus*) *germari* Waterhouse.
60. *Metapocyrtus* (*Trachycyrtus*) *magnigibbicollis* sp. nov.
61. *Metapocyrtus* (*Trachycyrtus*) *magnigibbicollis* sp. nov.
62. *Metapocyrtus* (*Metapocyrtus*) *caeruleomaculatus* sp. nov.
63. *Metapocyrtus* (*Metapocyrtus*) *caeruleomaculatus* sp. nov.
64. *Metapocyrtus* (*Metapocyrtus*) *abbrevilineatus* sp. nov.

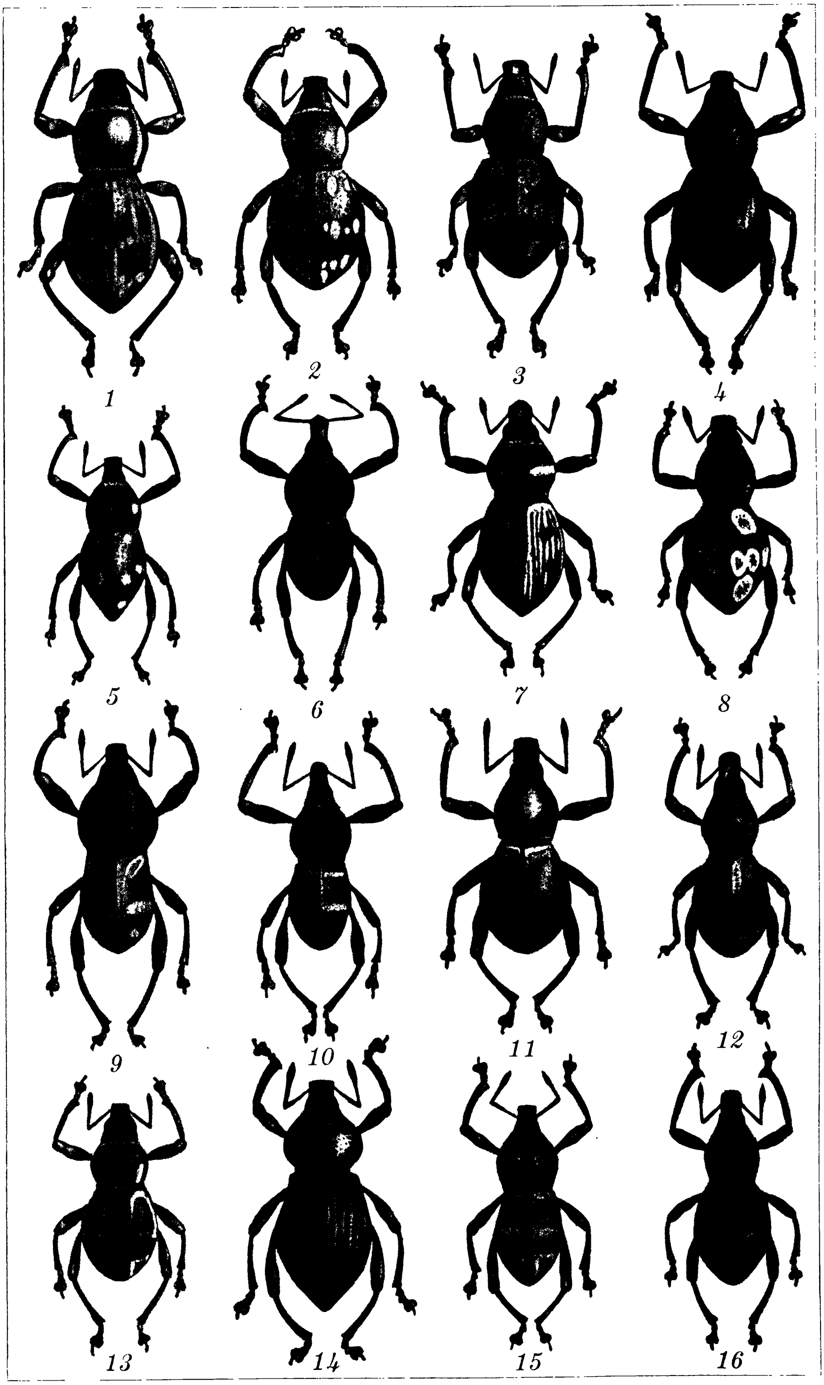

PLATE 1.

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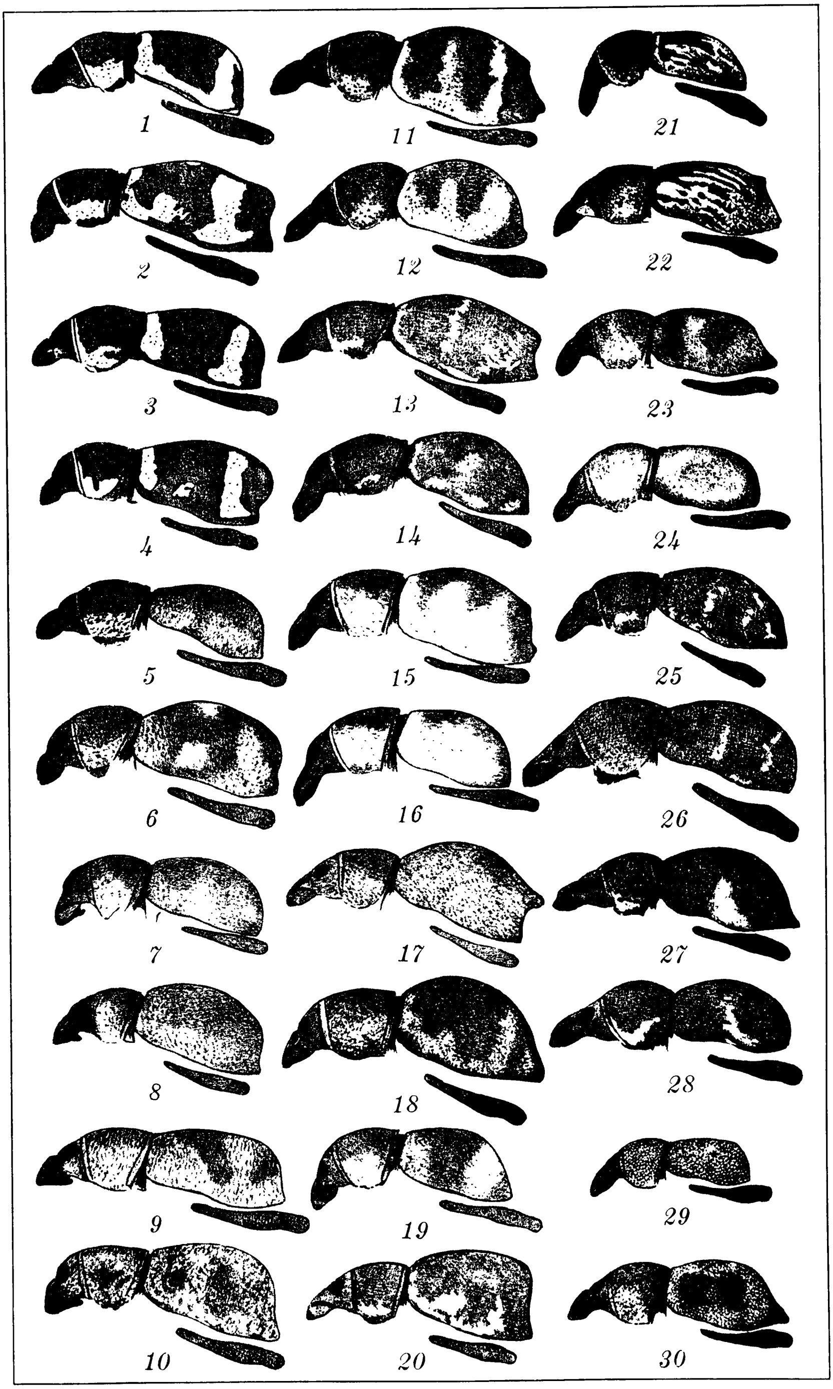
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PLATE 2.

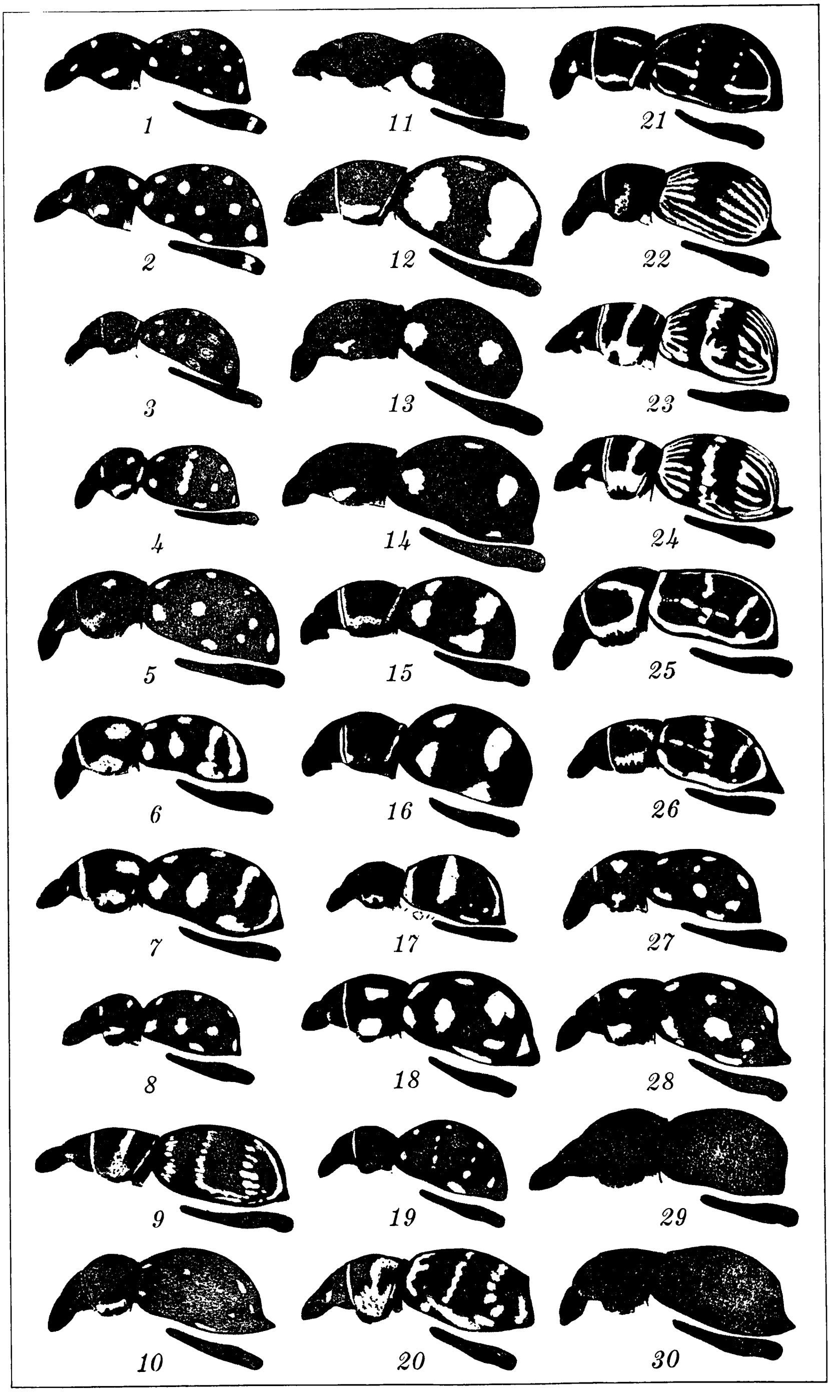
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PLATE 3.

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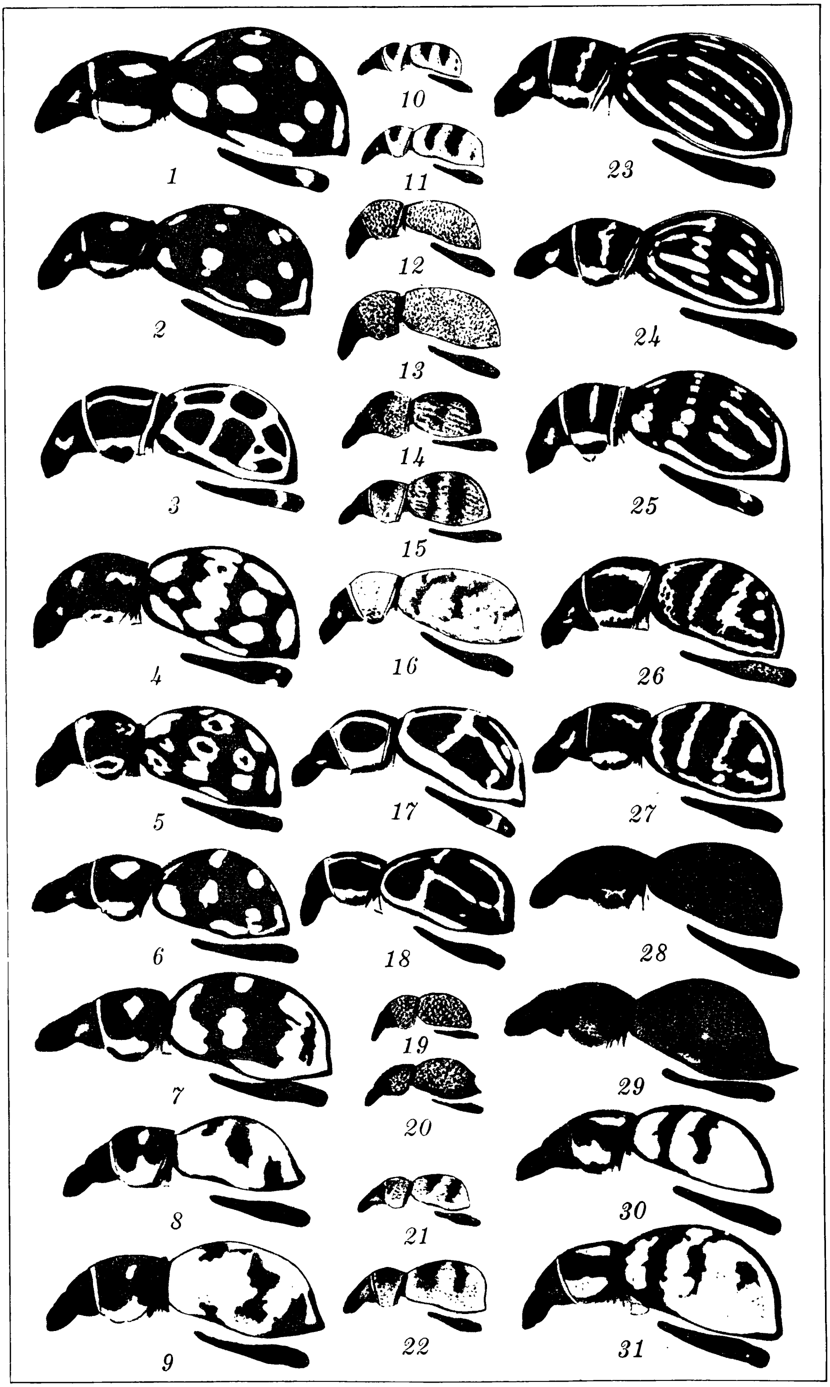
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PLATE 4.

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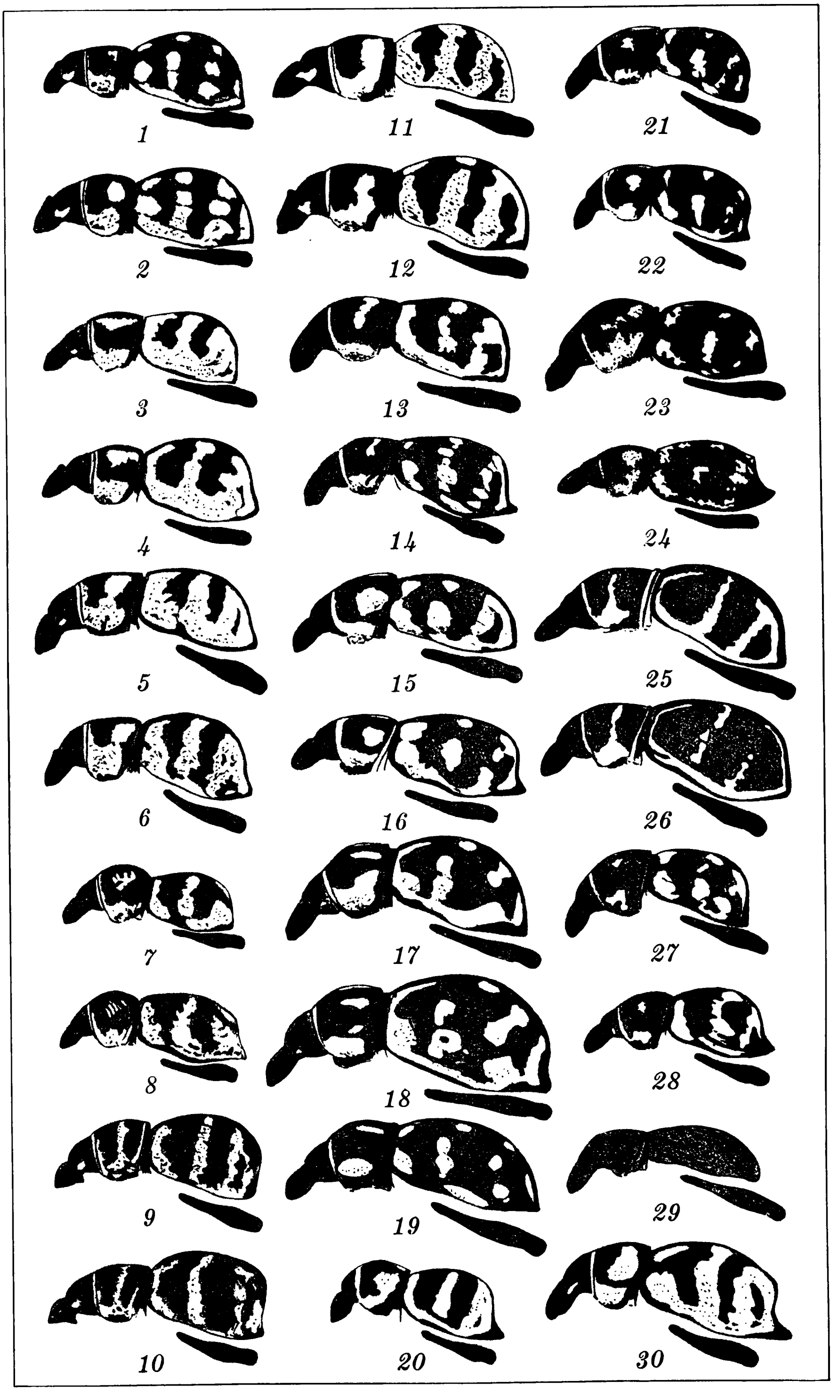
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PLATE 5.

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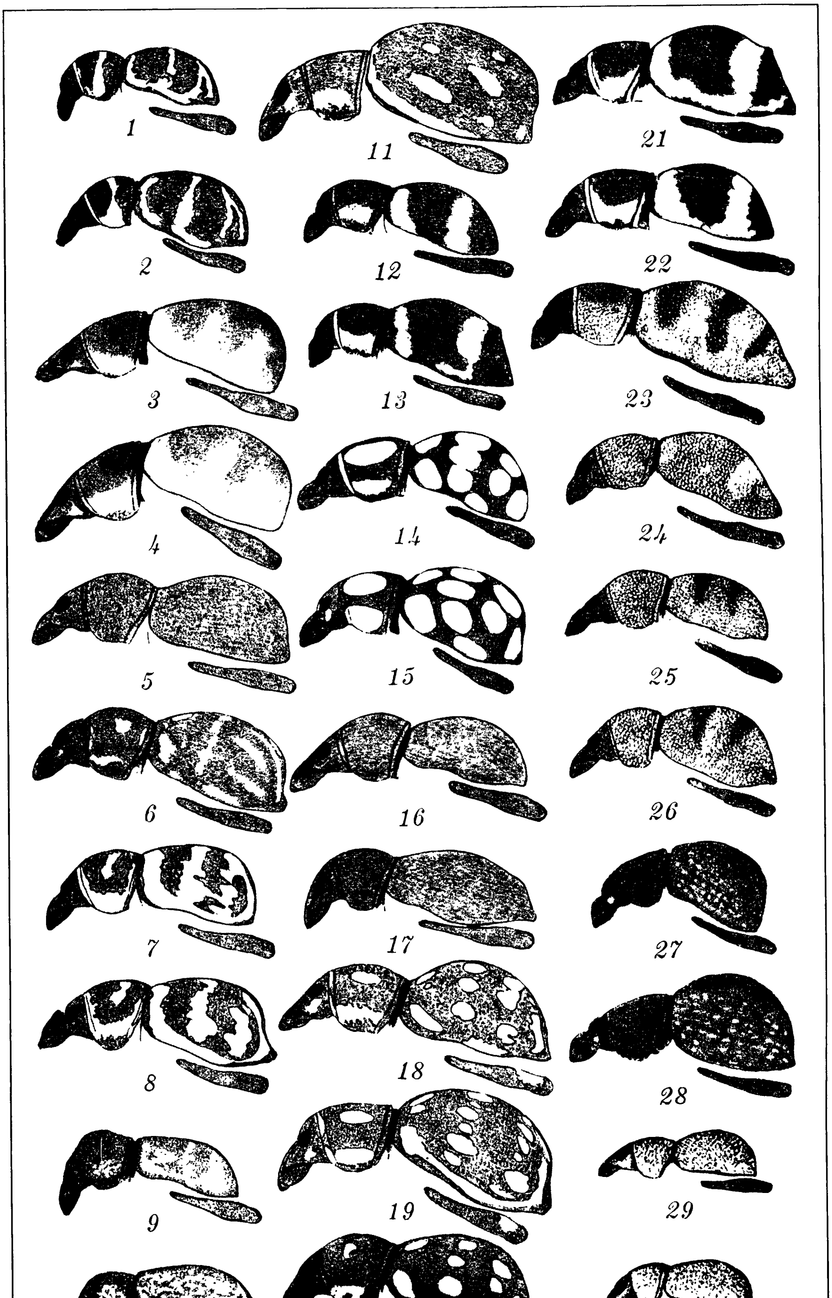
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PLATE 6.

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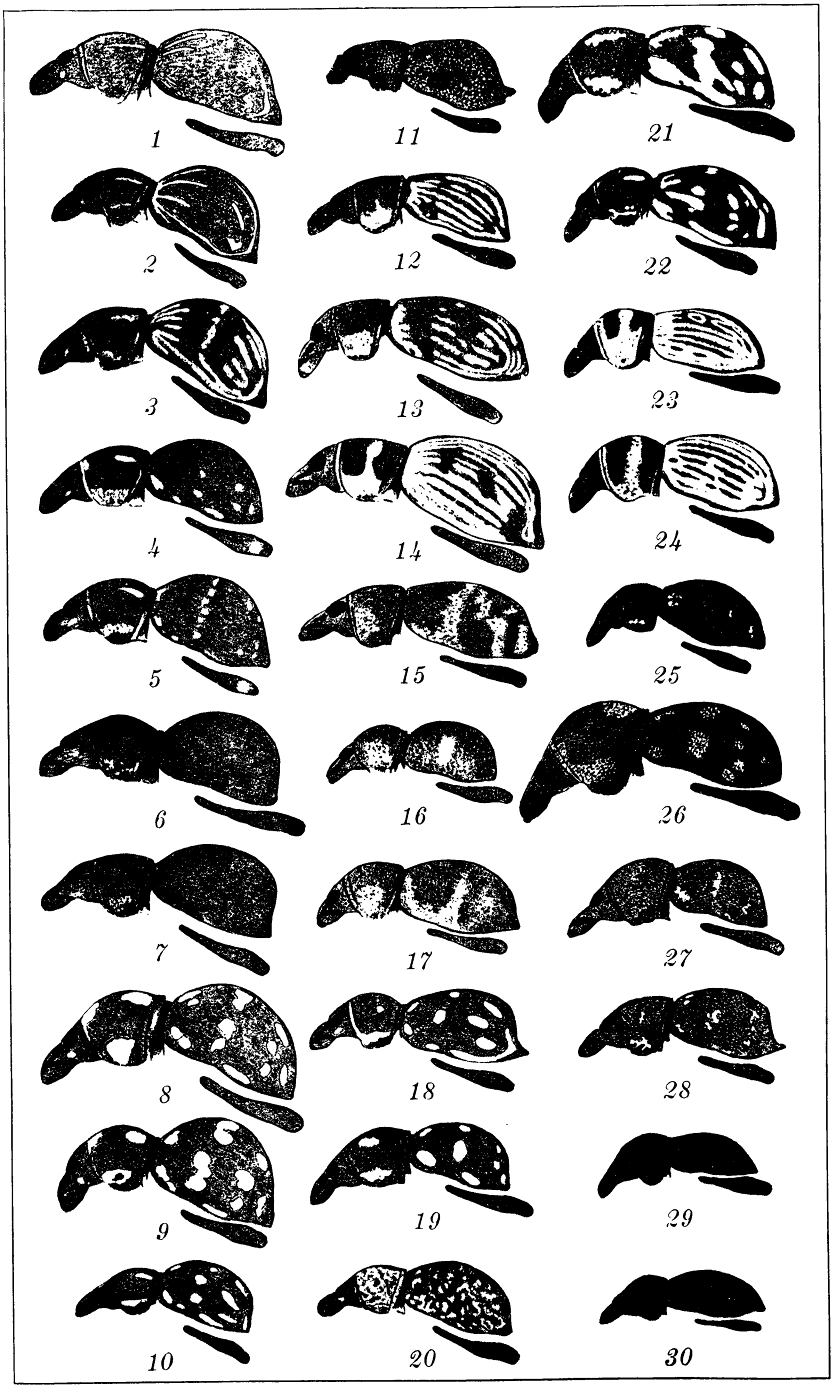
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PLATE 7.

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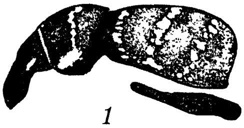
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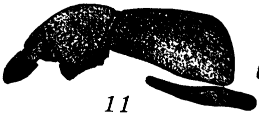
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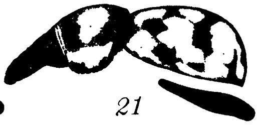
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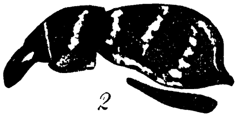
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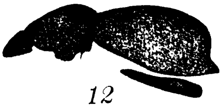
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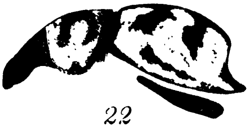
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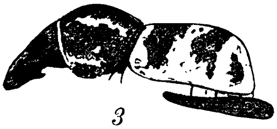
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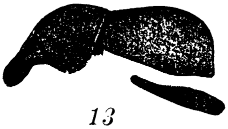
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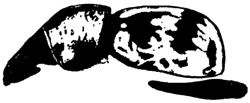
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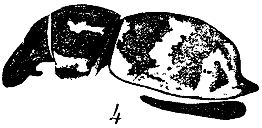
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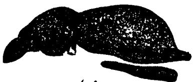
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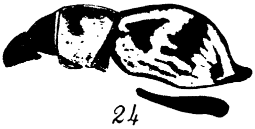
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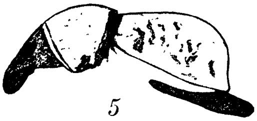
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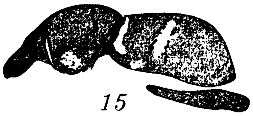
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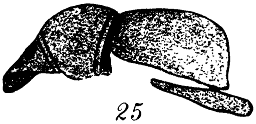
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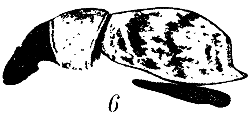
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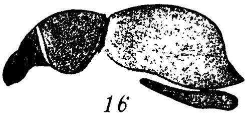
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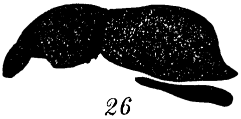
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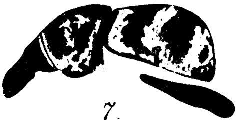
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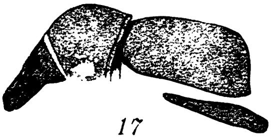
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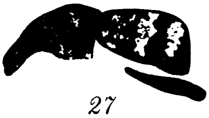
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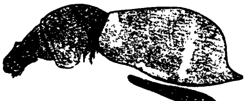
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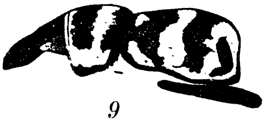
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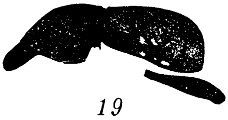
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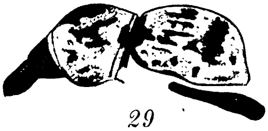
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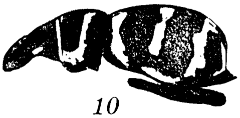
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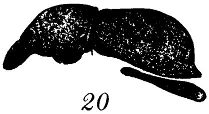
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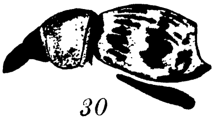
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PLATE 8.

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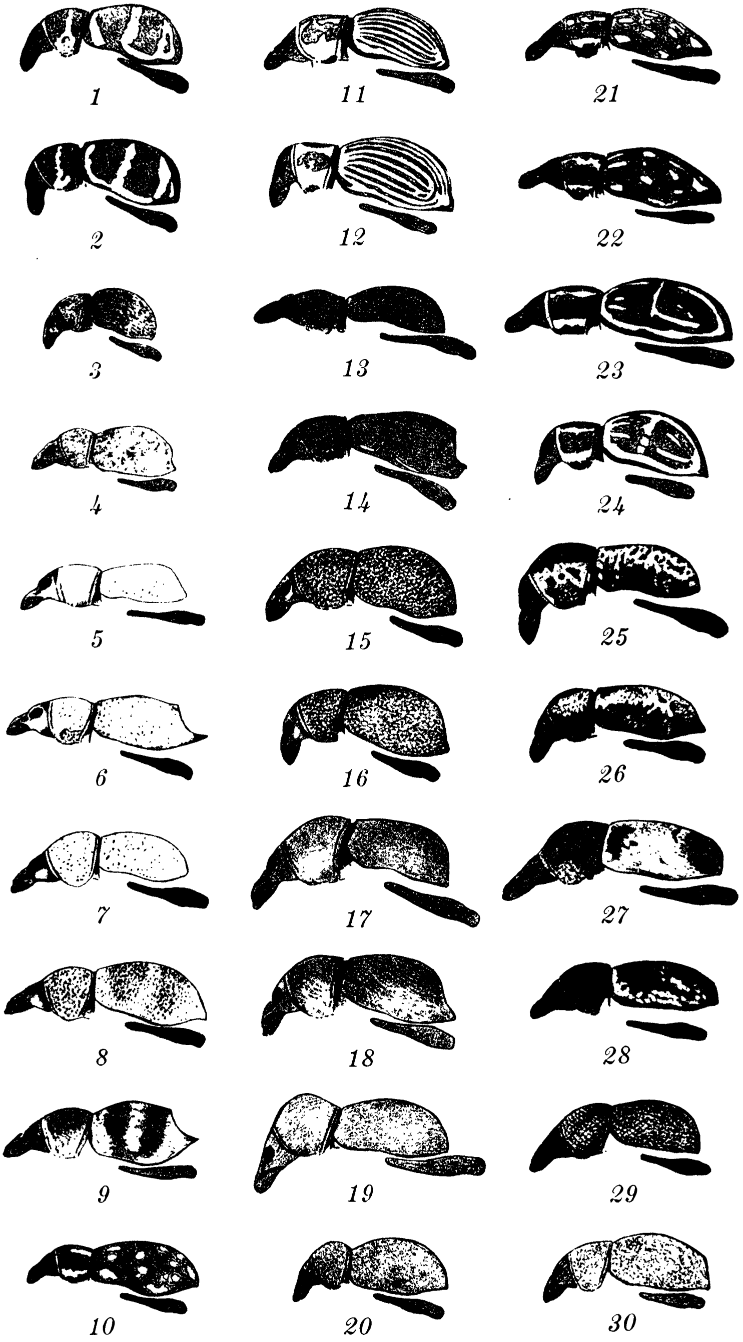
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PLATE 9.

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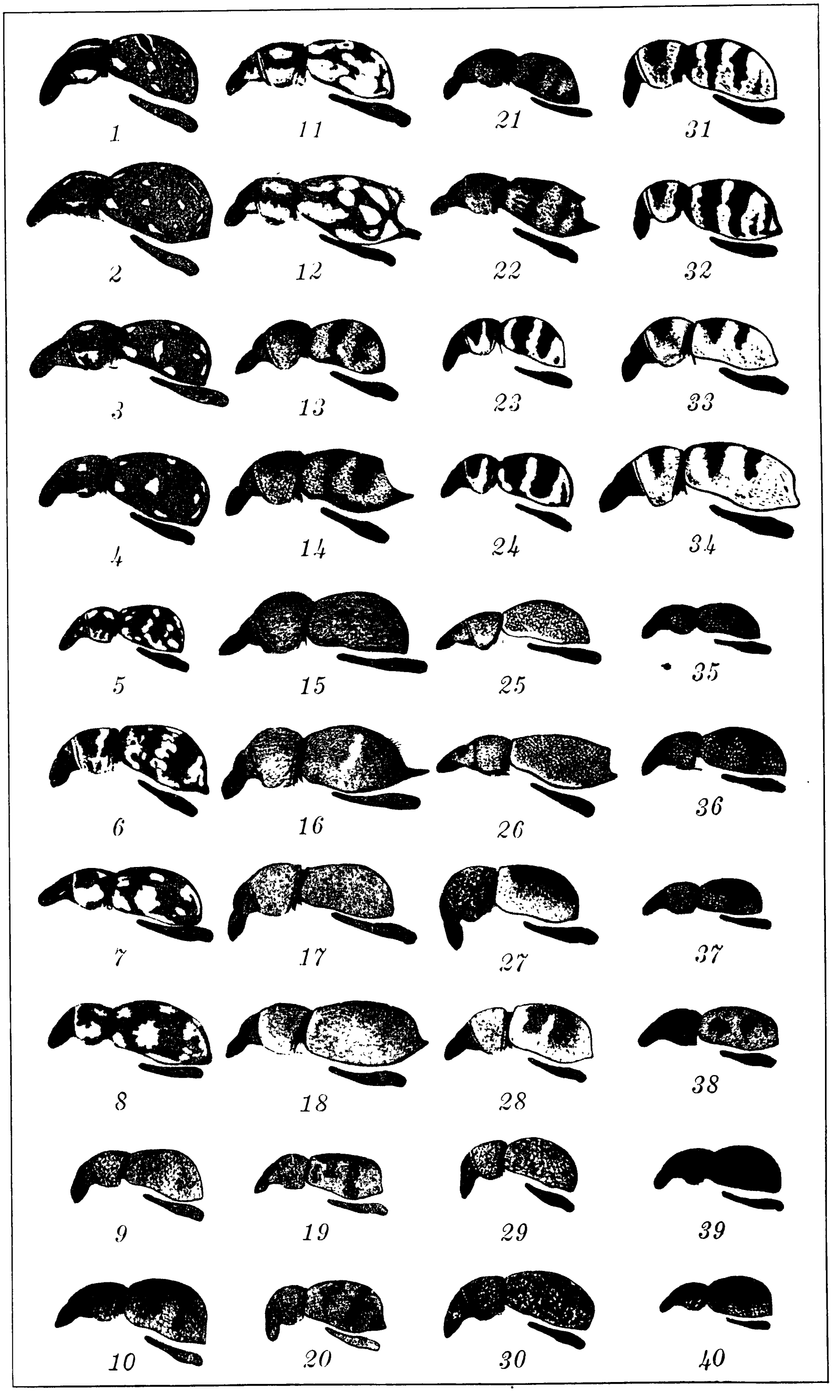
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PLATE 10.

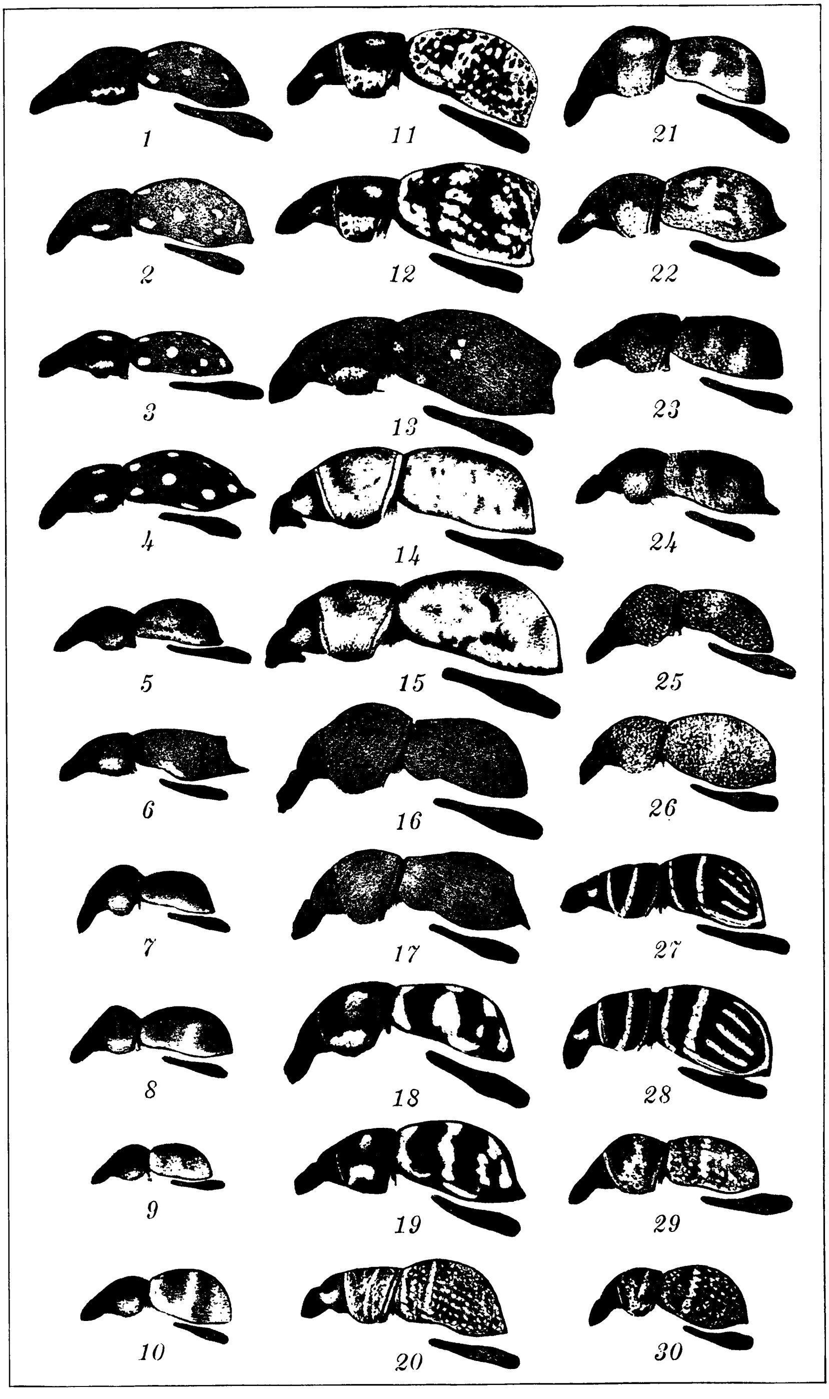
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PLATE 11.

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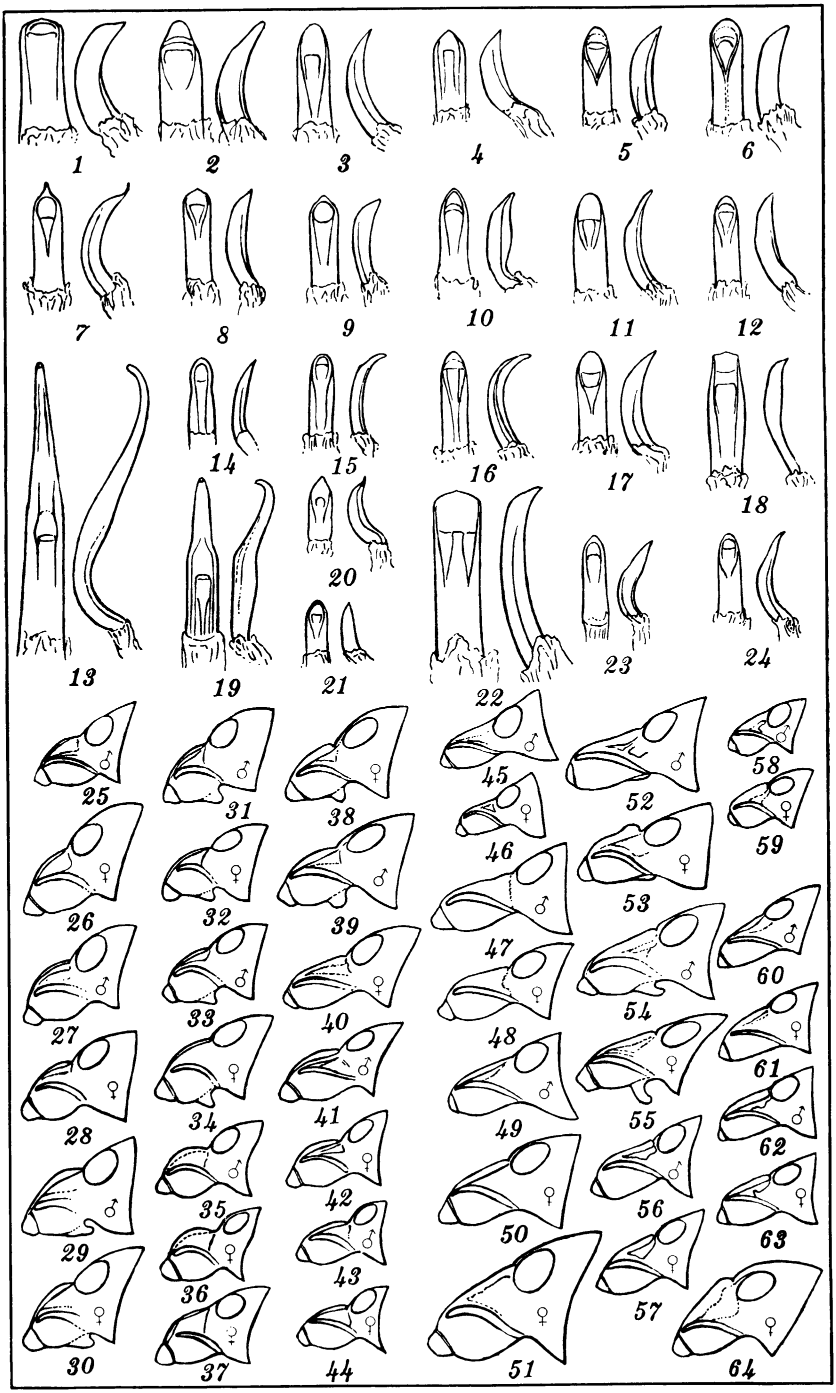
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PLATE 12.

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CHOLERA VACCINATION; ITS EFFECTIVENESS AS EVIDENCED BY THE PRESENCE OF ANTIBODIES IN THE BLOOD OF VACCINATED PERSONS

By OTTO SCHÖBL and JOSE ANDAYA
Of the Serum Laboratory, Bureau of Science, Manila

In many of the communications which treat on the procedure and results of anticholera vaccination, there are data to be found which indicate conclusively that, following the anticholera vaccination, there appear in the blood of the vaccinated persons immune bodies which persist there for a period of time varying from ten to fourteen months. These observations, made in various countries during anticholera campaigns in which various preparations and doses of cholera vaccine had been used, led to the conclusion that the immunity resulting from the vaccination lasted approximately one year. We pursued similar investigations in the Philippines. Although the fact that immune bodies are found in the blood of persons vaccinated with cholera vaccine had been previously established, it was considered of importance to repeat the investigations in order to see the results of our own vaccination and the effectiveness of the vaccine used in the Philippines, as well as to obtain information as to the time when revaccinations should be made under local conditions.

In the literature we find results of experiments with the blood of vaccinated persons in which the agglutination test and the bacteriolytic method were used for the detection of immune bodies in the blood of vaccinated people. In our experiments the complement fixation method was used.

PREPARATION AND PROPERTIES OF THE ANTIGEN

Six promptly agglutinable cholera vibrio strains were planted on acid agar and incubated at 37° C. for twenty-four hours. After that time the cultures were scraped off by means of platinum wire and emulsified in a flask containing 30 cubic centimeters of 5 per cent glycerine in normal salt solution. The emulsion was heated on a water bath at 60° C. for thirty minutes and then it was incubated at 37° C. for ten days; the emulsion was shaken vigorously several times a day. At the end of the ten days the emulsion was centrifuged until the supernatant fluid was clear. The supernatant fluid was collected in a bottle and stored. Bottles, centrifuge tubes, and pipettes were all sterilized before using. The antigen, the manner of preparation of which has just been given, in no way interfered with the hæmolytic system in the dilution of 1 to 160, but it exerted considerable anticomplementary action in dilution lower than 1 to 80. The antigenic property of this antigen was tested and a complete inhibition of hæmolysis resulted in dilution of the antigen 1 to 320 when mixed with rabbits' immune serum. Up to the dilution of the immune serum 1 to 150, complete inhibition resulted, while the dilutions of the serum up to 1 to 300 still gave strong inhibition. Inhibition was still noticeable, to a lesser degree, with the immune serum diluted 1 to 700. Two units of amboceptor were used for the test proper. The anti-monkey hæmolytic system was employed.

From these experiments the conclusion was drawn that the dilution of the antigen to be used for the test proper should be 1 to 320, representing as it does four times the dilution of the anticomplementary limit. The test of the blood of rabbits that had received one single injection of cholera vaccine subcutaneously showed that a single injection of 500 million killed cholera vibrios produced antibodies in the blood of the rabbits still demonstrable in the dilution of their serum 1 to 64. The tests made on a number of vaccinated persons comprise several groups.

In the first group eleven individuals of approximately the same age and weight were each given one single injection of 500 million.[1] One week after inoculation two vaccinated persons gave no evidence of immunity; the others all showed some degree of immunity (titer between $\frac{1}{4}$ and $\frac{1}{32}$; one gave titer of $\frac{1}{64}$).

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[1] The present practice of the Bureau of Science is to use a combined vaccine (2,000 million cholera, 1,000 million typhoid, and 500 million paratyphoid A). Cholera vaccine (3,000 million per cubic centimeter) is also being used.

In the second group seventeen individuals were given the same dose, but the test was performed on the twelfth day; that is to say, at a time when the antibodies are theoretically expected to reach the highest concentration in the blood. All of the persons vaccinated showed presence of antibodies (titer between $\frac{1}{4}$ and $\frac{1}{16}$).

In the third experiment five healthy persons were each given a single injection of 1,000 million and their blood serum was tested twelve days after the injection. All of these gave positive immune reaction (titer $\frac{1}{32}$ to $\frac{1}{64}$).

In the fourth group were persons who received an injection of 500 million and one of 1,000 million, a week apart. They were tested one week after the second injection and all showed evidence of immunity (one individual showed low titer, $\frac{1}{4}$, while the rest varied between $\frac{1}{64}$ and $\frac{1}{128}$).

As far as the persistence of the antibodies in the blood of vaccinated persons is concerned, the second group (that is, those that received a single injection of 500 million) still showed traces of immune bodies in their blood about one hundred eighty days after the single injection. Two hundred twenty to two hundred eighty-four days after the injection only one of the persons tested showed a trace of demonstrable immunity; the rest were negative. When the double dose (1,000 million) was given in a single injection, distinct evidence of immunity was found on the one hundred seventeenth and the one hundred eightieth days. On the two hundred twenty-second day one still gave a positive result, and one on the two hundred fortieth day was negative.

Double injection evidently caused the immune bodies to persist in a fair amount (titer $\frac{1}{2}$ to $\frac{1}{64}$) in the blood of vaccinated persons, according to examinations made on the sixty-seventh, one hundred sixty-sixth, and two hundred eighteenth day after the second injection.

It is evident from these investigations that the antibodies produced by the injection of cholera vaccine persisted in the blood of the vaccinated persons between six and ten months. If we may consider the titer of the serum as an indicator of the degree of existing immunity, we can draw the conclusion that the degree of immunity and the duration of immunity following anticholera vaccination are directly dependent on the amount of the vaccine injected, but more so on the number of injections given, barring of course individual variations. It is generally claimed that a person vaccinated against cholera is just as susceptible to cholera infection as a nonvaccinated person, if not more so, during the first five days following the vaccination. This assertion is based on observations of incidence of cholera infection in vaccinated persons, and appears to be in agreement with theoretical considerations and experimental findings. But, considering the fact that the immunity is only relative, it may be well to bear in mind the findings in our experiments (which undoubtedly occur frequently); namely, that development of immunity is sometimes delayed for no apparent reason. Although the age, weight, and general condition were the same, some individuals showed relatively low titer when their serum was tested shortly after vaccination. This seems to be of practical significance in countries where cholera occurs endemically and where cholera epidemics occur in certain seasons with more or less constant regularity.

The wholesale vaccination in areas where outbreaks occur every year, as well as in places where sporadic cases occur during the off season, should be completed at least one month before the time when an epidemic may reasonably be expected to occur.

CONCLUSION

The amount of antibodies found in the blood of cholera-vaccinated persons stands in direct proportion to the amount of vaccine injected and to the number of injections given. Both the titer of the serum and the persistence of antibodies depend on the number of injections to a higher degree than on the amount of the vaccine given.

In Tables 1, 2, 3 and 4, 0 indicates negative result, and — indicates that no test was made. Titer, expressed in these tables by fractions, means the highest dilution of the serum which still gave noticeable inhibition of hæmolysis in the presence of cholera antigen.

TABLE 1.—*First group, single injection; dose, 500 million; tested one week after injection.*

Serial No. of vaccinated persons.	Age.	Weight.	Titer.
	Years.	*kg.*	
1	21	44	1/16
2	19	43	1/64
3	18	48	0
4	20	47	1/32
5	32	46	1/16
6	26	48	1/16
7	18	40	1/16
8	33	53	1/8
9	37	54	0
10	16	45	1/4
11	19	49	1/16
Non-vaccinated control			0

TABLE 2.—*Second group, single injection; dose, 500 million; tested twelve days after injection.*

Serial No. of vaccinated persons.	Age.	Weight.	Titer.	Retest.			
				Days after injection.	Titer.	Days after injection.	Titer.
	Years.	*kg.*					
1	21	43	1/4	—	—	—	—
2	27	53	1/4	180	1/4	240	0
3	21	57	1/8	—	—	—	—
4	23	43	1/16	180	1/16	284	0
5	22	45	1/16	203	1/32	284	1/2
6	20	36	1/16	203	1/2	284	0
7	22	40	1/16	203	1/2	—	—
8	25	?	1/4	—	—	—	—
9	26	50	1/8	160	1/16	—	—
10	40	45	1/16	188	1/2	235	0
11	18	44	1/16	—	—	—	—
12	23	?	1/8	—	—	—	—
13	19	46	1/8	184	1/2	220	0
14	29	40	1/4	188	1/4	240	0
15	17	55	1/8	184	1/2	—	—
16	22	43	1/16				
17	18	45	1/8				
Non-vaccinated control			0		0		0

TABLE 3.—*Third group, single injection; dose, 1,000 million; tested twelve days after injection.*

Serial No. of vaccinated persons.	Age.	Weight.	Titer.	Retest.			
				Days after injection.	Titer.	Days after injection.	Titer.
	Years.	*kg.*					
1	19	55	1/64	—	—	—	
2	25	41	1/32	117	1/32	—	—
3	38	53	1/32	180	1/4	241	0
4	20	55	1/32	—	—	—	—
5	20	51	1/64	180	1/4	222	1/2
Unvaccinated control	—	—	0	—	0	—	0

TABLE 4.—*Fourth group, double injection; doses, 500 million first and 1,000 million second injection, seven days apart; tested one week after second injection.*

Serial No. of vaccinated persons.	Age.	Weight.	Titer.	Retest.	
				Days after injection.	Titer.
	Years.	*kg.*			
1	21	44	1/128	218	1/2
2	19	43	1/128	67	1/64
3	18	48	1/4	67	1/64
4	20	47	1/128	219	1/16
5	32	46	1/64	166	1/8
6	26	48	1/64	166	1/8
7	18	40	1/64	218	1/2
Unvaccinated control			0		0

AGGLUTININ FORMATION FOLLOWING THE USE OF CASTELLANI'S GLYCERO-VACCINE

By CRISTOBAL MANALANG

Of the Philippine Health Service, Zamboanga, P. I.

One of the difficulties encountered by the Philippine Health Service in its work is the complete administration of the standard three injections for immunization against cholera or typhoid in campaigns, particularly provincial campaigns. This is due to lack of trained personnel, long distances between houses and, most important of all, the tendency of the people to avoid succeeding injections after having received the first one. Preliminary experiments were made to note the presence or absence of agglutinins following one injection of the usual vaccine (1 cubic centimeter = cholera, 1,000 million; *B. typhosus*, 500 million; paratyphoid A, 250 million; paratyphoid B, 250 million). Ten prisoners from the municipal jail of Zamboanga were injected with 1 cubic centimeter of saline anticholera typhoid vaccine. Only one showed agglutination with cholera vibrio in 1–10 dilution after one month of observation.

Failing to obtain satisfactory anticholera agglutinin formation by the use of this vaccine we were tempted to investigate agglutinin formation by the use of a single dose of Castellani's vaccine. Although agglutinins are by no means the only indication of immunity, still, the study of this phase was the best we could do with our facilities. The vaccine used was prepared as follows:

Seed.—Two strains of cholera vibrio from the Manila epidemic of 1919; one strain of *B. typhosus* from the University of the Philippines, 1920; paratyphoid A and B from the Army Medical School, 1918.

Culture.—Plain nutrient agar using meat extract, reaction to phenophthalein about 0.5 per cent to 1 per cent acid. Put up in liter flat pharmacy small-necked bottles containing about 150 cubic centimeters of agar; when slanted a maximum agar surface of about 170 square centimeters is presented.

Inoculation.—Standard twenty-four-hour agar slant of the seed was emulsified in 15 cubic centimeters of saline and each bottle inoculated with 5 cubic centimeters of the emulsion, the agar surface covered by tilting, and the bottles incubated at room temperature (30° C.); 4 bottles were inoculated with cholera vibrio, 2 bottles with *B. typhosus,* and 1 bottle with B. paratyphoid A,[1] and 1 bottle with B. paratyphoid B.

After twenty-four hours at room temperature the growth in each bottle was emulsified in 125 cubic centimeters sterile saline, mixed in a sterile liter bottle and well shaken.

Standardization.—Wright's method and opacity method; 1 cubic centimeter of the mixture to contain 8,000 million (cholera 4,000 million; *B. typhosus,* 2,000 million; paratyphoid A, 1,000 million; paratyphoid B, 1,000 million) approximately; preservation, 0.5 per cent phenol, 2 per cent glycerine.

Water bath.—Fifteen to twenty minutes at 60° to 65° C. Tested for sterility by culture and animal inoculation.

Bottling.—Passed through sterile bottling set with sterile gauze filter into sterile bottles and stoppered with sterile corks.

Dose.—One cubic centimeter for adults. Children, according to age and development (under 5 years, 0.25 cubic centimeter; 5 to 10 years, 0.5 cubic centimeter; 11 to 15 years, 0.75 cubic centimeter).

TECHNIC OF THE TEST

At least one capillary drop of serum was obtained by the usual method and mixed with 9 capillary drops of normal saline solution. From this other dilutions of 1–20, 1–40, etc., were made. Fresh eight to twenty-four-hour-old cholera slant was used for the test by making a slightly turbid suspension of this in normal saline solution. One loop of this added to one loop of the 1–10 serum dilution gave a final dilution of 1–20, etc. The test was observed under the microscope and controlled with or without normal serum in a separate hanging drop. Observations were made at room temperature (about 28 to 30° C.) after one hour.

The sera of forty-three student nurses and attendants of the Zamboanga General Hospital were first examined for anticholera agglutinin and all were found negative in 1–20 dilution at room temperature, after one hour. They were then injected subcutaneously with 1 cubic centimeter of the above-mentioned vaccine. The reactions in all of them were swelling of the arm, with heat, pain, and redness. Headache and indisposition were present in about one-third of the cases. Slight fever (37.5 to 38° C. per axilla) lasting from one to five hours in five cases. One chlorotic girl had to be admitted to the hospital for two days due to fever (37.5 to 39° C. per axilla) and weakness. With the exception of this one person, all continued at work.

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[1] Castellani's formula requires $\frac{1}{10}$ quantity of paratyphoid B.

The sera were tested against cholera vibrio every day during the first ten days, every two days during the following ten days, and once a week thereafter, using 1–20, 1–40, and 1–80 dilutions.

These observations were continued for one hundred sixty days and the following results were noted:

In six of the forty-three cases no agglutination in 1–20 dilution was found. Thirty-seven cases showed positive agglutination at some time. The appearance of positive reaction, in days, after injection is shown in Table 1.

TABLE 1.

Days after injection.	Cases.
6	1
8	1
9	1
10	15
12	9
14	2
15	1
21	3
29	1
39	1
48	1
80	1
Total	37

Table 2 shows the persistence of agglutinin in twenty positive cases which became negative in 1–20 dilution, during one hundred sixty days observation.

TABLE 2.

Days.	Cases.
14	1
19	1
27	1
30	3
51	2
80	6
120	6
Total	20

Table 3 shows the maximum titer of sera attained during observation.

TABLE 3.

Dilution.	Cases.
1–20	15
1–40	13
1–80 or more	9
Total	37

SUMMARY

A single dose of 1 cubic centimeter of Castellani's glycerovaccine (cholera, 4,000 million; *B. typhosus,* 2,000 million; paratyphoid A, 1,000 million; paratyphoid B, 1,000 million) produced anticholera agglutinin in thirty-seven of forty-three vaccinated persons.

Of the thirty-seven positive cases, agglutinins appeared in twenty-four cases between the ninth and fourteenth days after the single injection.

Six cases remained negative for one hundred sixty days of observation.

Of the thirty-seven positives, in twenty cases agglutination became negative in dilutions of 1–20 within one hundred sixty days after vaccination.

In more than 50 per cent of these cases agglutinins were present in the blood of vaccinated persons for a period of three to four months.

The formations of agglutinin observed in the blood of persons vaccinated with Castellani's vaccine were more satisfactory than those obtained with the usual saline vaccine when used in single 1-cubic-centimeter doses (cholera, 1,000 million; *B. typhosus,* 500 million; paratyphoid A, 250 million; paratyphoid B, 250 million).

The reactions, both local and general, were practically the same as those from saline vaccine, considering the number of bacteria given.

This vaccine was given to at least 40,000 people and not a single mishap was reported.

THE ANTHOMYIID GENUS DICHAETOMYIA MALLOCH (DIPTERA) IN THE PHILIPPINES

By J. R. MALLOCH
Of Washington, D. C.

The genus *Dichaetomyia* Malloch is a very homogeneous group and occurs in Africa, Asia, Australia, and islands in the Indian and South Pacific Oceans. No species is reported from Europe, the Americas, the extreme southern parts of Australia, or New Zealand.

The species are as a general rule robust in habitus and usually black and rufous yellow, though there are both entirely black and entirely yellowish species in the genus. The diagnostic characters are as follows:

Arista plumose; pteropleura hairy in part; a number of black hairs along lower margin of metathoracic spiracle and overlying the flap; third wing vein with some weak setulæ at base below; fourth wing vein more or less appreciably curved forward near its apex; hind tibia without an outstanding bristle on posterodorsal surface beyond middle; lower calyptra bare above, much larger than upper; sixth wing vein not extending to margin of wing; costal vein to apex of fourth vein; hind metatarsus without a ventral bristle at base. Some species have some very short hairs on the vertical portion of mesothorax immediately in front of base of scutellum, and some have also a few such hairs below the lower calyptra but they are difficult to see and often very sparse, so that no particular note is made of them in this paper.

It is very probable that many other species of the genus occur in the Philippines, as my material is not particularly abundant; but, in order to provide a means for the identification of those species I have seen, I present a key to the species available. I divide the species into two groups on a male character, or at least upon what has been stated by Stein to be such. The first group contains but three species, the distinguishing character being a comblike series of short stout bristles on the apical third or more of the fore femur on its anteroventral surface. The other species, thirteen in number, have no bristles on the anteroventral surface of the fore femur in either sex. This comb of bristles is met with in several other families of Diptera; namely, Drosophilidæ and Sapromyzidæ, and usually it is not a sexual character, though it may be so in this genus, as suggested by Stein.

Key to species of Dichaetomyia Malloch with fore femoral spines.

1. Slender species; head at least as high as wide when seen from in front, the face receding, and the area between eyes at ocelli as great as that above antennæ; fore tarsus distinctly longer than greatest width of head when seen from in front; legs fulvous yellow, hind tibiæ and tarsi a little darker .... **D. tenuis** sp. nov.
   More robust species; head wider than high when seen from in front, the face nearly vertical, and the area between eyes at ocelli much smaller than that above antennæ; fore tarsus shorter than greatest width of head when seen from in front .... 2.
2. Legs fulvous yellow; abdomen broadly semitranslucent yellowish basally; anterior intra-alar bristle distinct though small; scutellum yellow.
   D. pectinipes (Stein).
   Femora largely black; abdomen glossy black; anterior intra-alar bristle minute or absent; scutellum yellow at apex.... **D. semimutata** (Stein).

Dichaetomyia semimutata (Stein).

In his paper dealing with Walker's types of Anthomyiidæ in 1901 Stein described a female specimen from Sulu (?)[1] under the name *Spilogaster semimutata.* I have before me a male which evidently belongs to this species. Its possession of a comblike series of bristles on the apical third of the fore femur associates it closely with *Mydaea ruficoxa* Stein. No mention of this character is made by Stein in his description of the female of *semimutata,* but it may be a male character and not specific. I suspect that Stein's two names refer to the same species as there are only slight color differences evident in the descriptions and the male specimen before me might be equally well referred to either, *semimutata* having priority.

Male.—Black, shining, thorax with gray pruinescence and quadrivittate. Antennæ pale yellow, palpi black. Sides of mesonotum broadly honey yellow, apex of scutellum yellow. Abdomen entirely glossy black. Legs tawny yellow, coxæ and femora almost entirely fuscous. Wings, calyptræ, and halteres yellowish.

Frons linear. Dorsocentral bristles 2 + 3. Abdomen ovate. Fore femur with four or five short stout bristles on apical third of anteroventral surface; fore tibia without a median posterior bristle; mid femur with a few long bristles on basal half of posteroventral surface; mid tibia with two posterior bristles; hind femur with fine bristles on anteroventral surface, longest apically, and a few on apical half of posteroventral surface; hind tibia missing in the specimen before me. Wing normal. Length, 7 millimeters.

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[1] Probably Xulla or Sula, east of Celebes.

One specimen, Mount Maquiling, Laguna Province, Luzon (*Baker*).

Dichaetomyia pectinipes (Stein).

Male.—Differs from the foregoing in having the lateral margins of thorax, scutellum, pleura in large part, most of basal half of abdomen, and all of the legs testaceous yellow.

Structurally as last, differing in having the comb of bristles on fore femur not so stout and the hind femur with short fine bristles on basal two-thirds of posteroventral surface. Hind tibia with one anterodorsal and two or three anteroventral bristles. Length, 7 millimeters.

Originally described from Java. I have before me one male from Mount Maquiling, Laguna Province, Luzon (*Baker*).

Dichaetomyia tenuis sp. nov.

Male.—Head black, antennæ yellow, palpi black. Thorax tawny yellow, with four or six blackish vittæ which are more or less fused; pleura largely fuscous; scutellum yellow or brownish. Abdomen glossy black. Legs including coxæ tawny yellow. Wings, calyptræ, and halteres yellowish.

Head about as high as wide in front; frons nearly as wide as third antennal segment; face receding. Thorax as in preceding species but much slenderer and the pteropleural hairs very fine and sparse. Abdomen slender. Legs longer than in last species, the bristling similar, fore femoral comb stout; mid tibia with three posterior bristles; hind femur with bristles on apical third of anteroventral and posteroventral surfaces; hind tibia with one anterodorsal and one or two anteroventral bristles. Wing narrow. Length, 5 millimeters; of wing, 5.

Type, Mount Maquiling, Laguna Province, Luzon. Paratype, Mount Banahao, Laguna Province (*Baker*).

Key to species of Dichaetomyia Malloch, vera.

1. At least the femora largely or entirely black........ 2.
   Femora and tibiæ, and sometimes also the tarsi yellow or fulvous.... 7.
2. Fore tibia with a strong posterior bristle near middle........ 3.
   Fore tibia without a bristle near middle on posterior side........ 6.

3. Thorax with three pairs of strong postsutural dorsocentral bristles.. 4.
Thorax with four pairs of postsutural dorsocentrals, the anterior two pairs very weak; third antennal segment fuscous; costal thorn long. **D. pallitarsis** (Stein).

4. Third antennal segment fuscous; anterior presutural dorsocentrals strong .... **D. nigrita** sp. nov.
The entire antennæ pale yellow; anterior presutural dorsocentral very weak and short.......... 5.

5. Abdomen entirely black; scutellum tawny yellow.... **D. atratula** sp. nov.
Abdomen largely translucent yellow at base; scutellum black. **D. subpellucens** sp. nov.

6. Legs pitchy black, the tibiæ imperceptibly paler; yellow color of humeral angle not continued to base of wing........ **D. dimidiata** (Stein).
Legs black, tibiæ brownish yellow; a broad yellowish streak from humeral angle to base of wing.......... **D. flavocaudata** sp. nov.

7. Fore tibia with two prominent posterior bristles near middle; thorax with 2 + 3 dorsocentrals, all long; third antennal segment largely brown or fuscous.......... 8.
Fore tibia either unarmed at middle or with but one posterior bristle .... 9.

8. Dorsum of thorax and scutellum black; pleura largely black. **D. bisetosa** sp. nov.
Dorsum of thorax yellow, with two broad black vittæ which extend over sides of scutellum; pleura almost entirely yellow. **D. dubia** sp. nov.

9. Sides of scutellum with numerous short black setulose hairs below the level of the strong bristles which extend to lower margin and even invade the ventral surface of scutellum; thorax with 2 + 4 dorsocentrals .... 10.
Hairs not descending much below the level of the strong scutellar bristles, never extending to lower margin of sides; thorax with 2 + 3 or 1 + 3 dorsocentrals.......... 11.

10. Fore tibia unarmed at middle; hind femur in male without a stout thorn below, and not swollen near base.... **D. quadrata** (Wiedemann).
Fore tibia in male with a long posterior median bristle, in female with one anterodorsal and one posterior bristle near middle; hind femur of male with a long strong thorn near apex on ventral surface which is directed obliquely toward base of femur, the femur swollen near base and with some short black bristles on the ventral swollen part.......... **D. armata** (Stein).

11. Fore tibia with a median posterior bristle; anterior presutural dorsocentrals small; palpi black or brown.......... 12.
Fore tibia without a median posterior bristle.......... 13.

12. Base of abdomen broadly yellow in both sexes.... **D. fulvitarsis** sp. nov.
Abdomen glossy black to base.... **D. fulvitarsis** var. **nigriventris** var nov.

13. Palpi yellow; tarsi fuscous; apical two or three segments of fore tarsi in female broadened.......... **D. latitarsis** (Stein).
Palpi fuscous; tarsi but little darker than tibiæ; fore tarsi in female normal .... **D. apicalis** (Stein).

Dichaetomyia pallitarsis (Stein).

The female has the same head structure as that of *fulvitarsis*, the third antennal segment is fuscous, palpi black. Thorax black, slightly gray pruinescent and with four black vittæ; humeri yellowish; scutellum and abdomen black. Legs black, tibiæ and tarsi rufous yellow. Wings yellowish. Calyptræ whitish. Knobs of halteres dark brown.

Chætotaxy of thorax as stated in key. Fore tibia with one median posterior bristle; mid tibia with three posterior bristles; hind femur with two or three preapical anteroventral bristles, and some long basal posteroventral hairs; hind tibia with two anterodorsal and two or three anteroventral bristles, the posterodorsal setulæ rather pronounced. Costal thorn distinct, the setulæ rather strong; first posterior cell hardly narrowed at apex. Length, 6.5 millimeters.

One female, Los Baños, Laguna Province, Luzon (*Baker*). Originally described from Java.

Dichaetomyia nigrita sp. nov.

Female.—Black, slightly shining. Antennæ brown, third segment fuscous; palpi fuscous. Thorax entirely black, dorsum with slight gray pruinescence, quadrivittate. Abdomen black, broadly yellow at base. Legs black, tibiæ rufous yellow, tarsi brown. Wings brownish. Calyptræ yellowish.

Frons at vertex one-fourth of the head width. Thorax with 2 + 3 dorsocentrals, all strong. Fore tibia with a median posterior bristle; mid tibia with two posterior bristles; hind femur with a sparse series of fine anteroventral bristles; hind tibia with one anterodorsal and two anteroventral bristles, and a posterodorsal setula near middle. Length, 6 millimeters.

Type, Negros, about 1,800 meters (6,000 feet) (*Whitehead*). British Museum.

Dichaetomyia atratula sp. nov.

Male and female.—Black, shining, with gray pruinescence on dorsum of thorax, which is quadrivittate. Antennæ yellow; palpi black. Lateral margins of thorax rather broadly, scutellum entirely, honey yellow. Abdomen black. Legs tawny yellow, coxæ and femora largely black; tarsi yellow. Bases of wings and calyptræ yellow. Halteres brown.

Frons of male linear. Anterior presutural dorsocentrals minute, the posterior pair and the postsutural three pairs long and strong. Fore tibia with one or two median posterior bristles; mid tibia with two posterior bristles; hind femur with about nine anteroventral bristles and none on posteroventral surface; hind tibia with one anterodorsal and two anteroventral bristles. First posterior cell narrowed at apex. Length, 5 to 6 millimeters.

Type and allotype, Mount Maquiling, Laguna Province, Luzon. Paratypes, one pair from Malinao, Tayabas Province, Luzon, and one male from Butuan, Mindanao (*Baker*).

Close to *Dichaetomyia nitidiventris* Stein, but that species has the humeri hardly yellowish and the scutellum black.

Dichaetomyia subpellucens sp. nov.

Male.—Black, shining. Antennæ pale yellow; palpi black. Humeral angles tawny yellow, dorsum of mesonotum with gray pruinescence, quadrivittate; scutellum black. Abdomen with first segment and most of second translucent yellowish. Coxæ and femora mostly black, tibiæ and tarsi tawny yellow. Wings and calyptræ yellowish. Knobs of halteres dull yellow.

Head and thorax as in *Dichaetomyia atratula.* Legs as in that species, but the hind femur with fewer anteroventral bristles. Length, 5.5 millimeters.

Type, Mount Maquiling, Laguna Province, Luzon (*Baker*).

Dichaetomyia dimidiata (Stein).

Male and female.—Black, shining. Antennæ pale yellow. Humeral angles of thorax, abdomen entirely, or with the exception of some patches on apical three tergites, honey yellow. Legs entirely black.

Thoracic dorsocentrals 2 + 3, the anterior presutural pair short. Frons linear in male, one-third of the head width in female. Fore tibia without a median posterior bristle; mid tibia with two posterior bristles; hind femur with four or five fine widely spaced anteroventral bristles and one or two similar bristles on basal half of posteroventral surface; hind tibia with one bristle and some long hairs on anterodorsal surface in male, the hairs absent in female, and one or two anteroventral bristles in both sexes. First posterior cell narrowed at apex. Length, 4 to 5 millimeters.

Originally described from Java.

Before me are three males and one female from Mount Maquiling, Laguna Province, Luzon (*Baker*).

Stein redescribed this species in 1909, as *Mydaea maculiventris* from Java.

Dichaetomyia flavocaudata sp. nov.

Male and female.—General habitus as in preceding species. The head is black with pale yellow antennæ. Thorax fuscous, shining, but with gray pruinescence which is most distinct on dorsum when viewed from behind; disk with four faint vittæ; humeri, lateral margins of mesonotum, upper margin of pleura, and sutures of latter yellowish. Abdomen with usually all of basal, anterior half of second, and apex of fourth tergite yellow. Legs fuscous, tibiæ brownish yellow. Wings, calyptræ, and halteres yellowish.

Head as in the preceding species, the eyes bare and almost touching in the male. Anterior intra-alar bristle present; postsutural dorsocentrals three; prealar short. Abdomen ovate, basal sternite hairy. Fore and mid legs as in *Dichaetomyia dimidiata;* hind femur in both sexes with some bristles on apical half or more of posteroventral surface, the longest and strongest one a little basad of middle, sometimes one or two weaker bristles basad of it; the anteroventral surface has a series of widely spaced bristles from base to apex, weakest in middle. In other respects as *dimidiata.* Length, 4 to 6 millimeters.

Type, allotype, and three female paratypes, Mount Maquiling, Laguna Province, Luzon (*Baker*). One female paratype deposited in British Museum.

Dichaetomyia bisetosa sp. nov.

Male.—Black, shining. Head including antennæ and palpi brown or fuscous. Dorsum of thorax with grayish pruinescence, most distinct when seen from behind, the vittæ visible only in front and very narrow; humeral angles broadly yellow, the pale color hardly reaching base of wing; scutellum black; pleura black-brown, paler in front and along sutures. Abdomen with first visible tergite, anterior half of second, and apex of fourth testaceous yellow. Legs yellow, tarsi black. Wings, halteres, and calyptræ yellowish.

Head as in *Dichaetomyia quadrata* (Wiedemann). Thorax with dorsocentrals 2 + 3, all strong, discal hairs rather long; sometimes two pairs of distinct prescutellar acrostichals; sides of scutellum bare as in all the preceding species. Abdomen similar to that of *quadrata.* Fore tibia with two long posterior median bristles; mid femur with some long fine posteroventral bristles; mid tibia with two posterior bristles; hind femur with a complete series of anteroventral bristles, and some shorter bristles on middle of posteroventral surface; hind tibia with one anterodorsal and three or four anteroventral bristles, and some setulæ on posterodorsal surface as in *quadrata.*

Female.—Eyes separated by less than one-third of the head width. Otherwise like the male.

Length, 6 to 7.5 millimeters.

Type, male, allotype, one male and four female paratypes, Mount Maquiling, Laguna Province, Luzon (*Baker*). One female paratype, Baguio, Benguet Subprovince, Luzon (*Baker*).

Dichaetomyia dubia sp. nov.

Male.—Glossy fulvous yellow. Head fuscous; palpi and antennæ blackish brown, the latter paler basally. Thorax with slight whitish pruinescence and two broad blackish vittæ on dorsum, the latter extending over sides of scutellum; two fuscous spots below bases of wings and some faint dark areas on pleura posteriorly; metanotum dark brown. Abdomen polished, apical half of second visible tergite, all of third, and the fourth except its apex black. Tarsi fuscous. Wings yellowish, veins brown, bright orange at bases. Calyptræ and halteres yellowish.

Eyes bare; frons linear above, with setulæ on lower third; parafacials linear; cheek as high as width of third antennal segment, the latter about three times as long as second, and slender; arista plumose; palpi slender. Thorax with three pairs of postsutural dorsocentrals, both intra-alars and the dorsocentrals very long, the prealar moderately long; scutellum bare on sides; lower posterior angle of hypopleura with a few short hairs. Basal abdominal sternite hairy; abdomen ovate. Fore tibia with two posterior median bristles; mid femur with sparse long fine bristles on posteroventral surface; mid tibia with two posterior bristles; hind femur with sparse fine anteroventral bristles, and a few shorter posteroventral bristles on median third; hind tibia with one long anterodorsal and about four short anteroventral bristles. Third vein setulose below at base as usual, fourth but little bent forward at apex. Length, 8 millimeters.

Type, Baguio, Benguet Subprovince, Luzon (*Baker*).

This may be the species that Stein placed in his key to the species of *Mydaea* under the name *distincta* sp. nov. He did not describe it, however; and he neither stated the region from which his specimen came nor listed it in his catalogue of the Anthomyiidæ of the world, in 1919.

Dichaetomyia quadrata (Wiedemann).

Rather variable in color. Head black, antennæ orange yellow, palpi fuscous, rarely yellowish. Thorax black on dorsum, with gray pruinescence and four blackish vittæ, the lateral margins, scutellum, and pleural sutures tawny yellow. Abdomen tawny yellow, generally more or less blackened apically, sometimes yellow only at base. Legs rufous yellow, tarsi darkened apically. Wings, calyptræ, and halteres yellowish.

Male.—Eyes almost nude; frons linear, setulose anteriorly, each orbit with one or two weak hairs in front of anterior ocellus; head normal in other respects. Thorax with four pairs of postsutural dorsocentrals; sides of scutellum with the hairs descending to lowest level, and sometimes invading ventral surface. Second abdominal sternite with a number of tiny black setulæ at apex, basal sternite hairy. Fore tibia unarmed at middle; mid tibia with two or three posterior bristles; hind femur with some bristles on apical half of anteroventral surface and a series of fine setulose hairs on basal half or more of posteroventral surface; hind tibia with one anterodorsal and two or three weak anteroventral bristles, and the setulæ on apical half of posterodorsal surface rather distinct. First posterior cell hardly narrowed at apex. Length, 6 to 8 millimeters.

One of the commonest oriental species. I have before me a large series from Mount Maquiling, Los Baños, and Manila, Luzon (*Baker*).

A male from the first locality has the eyes separated by fully the width across posterior ocelli, the interfrontal stripe not obliterated, and the orbits setulose on their entire length. The palpi in this specimen are yellow. I consider it possible that this may be a distinct species, but the other characters are so similar that, pending the receipt of more specimens, I prefer to leave it as *Dichaetomyia quadrata.*

Dichaetomyia armata (Stein).

Female.—Similar to *Dichaetomyia quadrata* (Wiedemann) in habitus and color. The thorax has two white pruinescent vittæ, one along each side on the line of dorsocentrals which gives the mesonotum the appearance of having three broad reddish vittæ, the median one being more or less divided by a narrow line of white pruinescence; palpi yellow; scutellum more elongate than in *quadrata,* the abdomen slenderer, sternopleurals equally spaced instead of the posterior two being closer; fore tibia with one anterodorsal and one posterior median bristle; hind femur bare on basal half of posteroventral surface and with one or two preapical anteroventral and posteroventral bristles; hind tibia with one or two weak posterodorsal bristles on basal half besides the usual anterodorsal and anteroventral bristles. Length, 6.5 to 7.5 millimeters.

Tangkulan, Bukidnon Province, Mindanao, and Mount Maquiling, Laguna Province, Luzon (*Baker*).

This species appears to be identical with one occurring in Australia, but I have seen no male specimens from the Philippines, so cannot be absolutely certain. They agree so closely that I believe there can be no reasonable doubt as to the identity of the species, however. The males which I have from Australia possess the characters that I have used to distinguish the species in the foregoing key.

Stein did not describe the species, merely including it in a key to the oriental species of the genus *Mydaea*. Though this genus, *Mydaea,* is not the same as *Dichaetomyia,* Stein included all the species of *Dichaetomyia* in it as well as many other species that are generically distinct from either of those genera.

Stein's species *Mydaea rigidiseta* described from New Guinea is very similar to *Dichaetomyia armata* as here accepted. The only characters separating the two species are the presence of only three pairs of postsutural dorsocentrals in the former and the different color of the abdomen. The last character is unreliable, as the spots mentioned by Stein may be absent or present in the same species. If the names are synonymous, then *rigidiseta* has priority and that name will have to be used for this species.

Dichaetomyia fulvitarsis sp. nov.

Male.—Differs from *Dichaetomyia bisetosa* in having the tarsi entirely yellow, the yellow color on sides of thorax confined to humeral angle, the apex of fourth tergite not yellow, and the fore tibia with but one posterior median bristle. The anterior presutural dorsocentral and the anterior intra-alar bristles are usually very short or even absent. The first posterior cell is narrower than in *bisetosa,* more noticeably so at apex, and the last section of fourth vein more nearly approximates twice the length of the preceding section.

Female.—Similar to male.

Length, 6 to 7 millimeters.

Type, male, allotype, one female and five male paratypes, Mount Maquiling, Laguna Province, Luzon (*Baker*).

Dichaetomyia fulvitarsis var. nigriventris var. nov.

Male and female.—Differs from the type form in having the abdomen entirely glossy black, and in averaging a little larger. Length, 7 to 8 millimeters.

Type, male, allotype, and one male and fifteen female paratypes, Baguio, Benguet Subprovince, Luzon (*Baker*).

The type form appears to be very like *Mydaea surgens* Stein, but that species has four pairs of postsutural dorsocentrals, and the thorax and scutellum and most of the abdomen rufous yellow. This species, which is also a *Dichaetomyia*, was described from Java.

Dichaetomyia latitarsis (Stein).

Male.—Head brownish; antennæ whitish yellow; palpi yellow. Thorax tawny yellow, disk infuscated, gray pruinescent, quadrivittate; scutellum yellow. Abdomen subpellucid yellow, dorsum of tergites 3 and 4 blackened, apex of fourth pale yellow. Legs yellow, tarsi fuscous. Wings, calyptræ, and halteres yellowish.

Frons linear; palpi slender. Thorax with 2 + 3 dorsocentrals; some minute black hairs below lower calyptra. Abdomen ovate, fourth tergite without discal bristles. Fore tibia unarmed at middle; mid femur with some short bristles on basal half; mid tibia with two or three posterior bristles; hind femur with short bristles on apical half of anteroventral and median half of posteroventral surface; hind tibia with one anterodorsal and two or three anteroventral bristles. Outer cross vein oblique and much curved.

Female.—Similar to male, but with the frons one-fifth of the head width at vertex, wider anteriorly; apical three segments of fore tarsi noticeably broadened; and hind femur bare on posteroventral surface.

Length, 9 to 10 millimeters.

I have seen only the male from the Philippines (Mount Maquiling), but have both sexes from India. Originally described from Java.

Dichaetomyia apicalis (Stein).

Female.—Head black, antennæ yellow, third antennal segment darker, palpi black and rather thick. Thorax tawny yellow, with a broad whitish pruinescent central vitta and a narrower one on each side of it on anterior portion. Abdomen tawny yellow, largely blackened apically. Legs including tarsi honey yellow. Wings, calyptræ, and halteres yellowish.

Frons about one-fifth of the head width at vertex; palpi slightly thickened. Thorax with 2 + 3 dorsocentrals; a few black hairs below lower calyptra. Fore tibia unarmed at middle; mid tibia with two or three posterior bristles; hind femur with three or four preapical anteroventral bristles; hind tibia with one anterodorsal and two anteroventral bristles. Wings normal. Length, 6 to 7 millimeters.

Localities, Mount Maquiling, Laguna Province, Luzon, and Butuan, Agusan Province, Mindanao (*Baker*).

Originally described from Java; occurs also in Formosa. I have seen only females.

CONTRIBUTION À L' ÉTUDE DES CEUTHORHYNCHINI

Par A. HUSTACHE

Lagny (Seine et Marne), France

Tous les Ceuthorhynchini faisant l'objet du présent travail m'out été obligeamment communiqués par Monsieur le Professeur C. F. Baker et tous fout partée de la collection et de la mienne.

Rhinoncus luzonicus sp. nov.

Femelle.—Oblong, noir brun en dessous, brun rouge en dessus, les pattes et les antennes d'un rouge ferrugineux, revêtu en dessus de très courtes soies squamuleuses, espacées, cendrées, soulevées, le prothorax orné de trois bandes peu régulières formées de soies plus serrées et les élytres d'une tache suturale postscutellaire formée de petites squamules oblongues, serrées et appliquées.

Rostre épais et court, plus court que le prothorax, rouge brun, droit, rugueux, pourvu de plusieurs fines elevées irrégulières lignes, la médiane plus nette. Tête à ponctuation serrée, le front impressionné entre les yeux. Yeux peu saillants.

Antennes fines, presque glabres; scape claviforme; 1^er^ article du funicule plus gros et plus long que le 2^e^, le 2^e^ faiblement conique, presque du double aussi long qu'épais, les articles suivants graduellement plus courts, ne croissant que peu en épaisseur, la massue ovale et pubescente.

Prothorax un peu plus court que large à la base, subconique, les côtés légèrement arqués dans leur tiers postérieur, la base faiblement bisinuée et presque deux fois aussi large que le bord antérieur, ce dernier très légèrement relevé, faiblement sinué-échancré au milieu; disque convexe, muni d'un sillon médian entier, pourvu de chaque côté d'un très petit tubercule; assez fortement impressionné latéralement derrière le bord antérieur, couvert d'un ponctuation forte, serrée, un peu confluente. Ecusson petit, enfoncé.

Elytres en demi ovale, beaucoup plus larges et plus du double aussi longs que le prothorax, une fois et demie à peine aussi longs que larges ensemble; convexes, légèrement déprimés le long de la base, cette dernière étroitement noire; calus huméral grand et élevé, calus antéapical effacé; stries fortes, ponctuées et glabres; interstries plus larges que les stries, convexes, rugueux, munis chacun de un ou deux rangs de soies mal alignées. Pygidium ponctué et pubescent.

Pattes normales, revêtues de fines soies squamuleuses blanches, appliquées, espacées.

Dessous à ponctuation assez serrée, les points couverts de squamules cendrées, lancéolées, appliquées.

Mâle.—Segment anal pourvu d'une fossette très légère; les tibias intermédiaires et postérieurs armés d'un petit onglet apical interne.

Longueur, 2.1 à 2.4 millimètres.

Luzon, Los Baños, Mount Maquiling (*Baker*).

La forme large et courte de cette espèce rappelle celle de *R. sibiricus* Faust, elle est cependant moins large que cette dernière et d'une tout outre coloration.

Mecysmoderes rugosus sp. nov.

Mâle.—Rhomboidal, brun rouge, les pattes et les antennes plus claires, presque mat, revêtu en dessus de très courtes soies squamuleuses jaunes, et espacées, ne voilant pas la coloration des téguments les points du dessous tapissés de squamules oblongues cendrées.

Rostre roux, épais, modérément arqué, aussi long que le prothorax, ponctué-striolé à la base, ponctué en evant, la carène médiane assez élevée et raccourcie en avant. Tête convexe, densément ponctuée, carénée en son milieu, le front profondément impressionné, les yeux peu saillants et entourés de fines soies, courtes et jaunes. Antennes assez courtes, le scape claviforme, le second article du funicule aussi long mais beaucoup moins épais que le 1er, les 4^{e}, 6^{e} plus épais, arrondis, le 6^{e} contigu à la massue, cette dernière ovale.

Prothorax transversal, peu arqué sur les côtés, resserré-étranglé derrièré le bord antérieur, plus fortement dans les angles antérieurs, le bord antérieur un peu relevé, sinué et avancé au milieu sur le vertex; convexe, couvert de points forts, serrés, confluents en rides et sillons longitudinaux plus forts en avant; pourvu d'une carène médiane vive, entière, atteignant en avant le bord antérieur, prolongée en arrière par l'épinè scutellaire, cette dernière prolongée entre le tiers antérieur des élytres; orné de chaque côté d'un bande peu tranchée de très courtes soies squamuleuses jaunes.

Elytres ovales-triangulaires, leur plus grande largeur entre les épaules, assez fortement rétrécis en arrière, peu plus longs que larges, les épaules très obliques, le calus huméral large, saillant et rugueux; moyennement convexes, non déprimés le long de la base; fortement sillonés-ponctués, les interstries convexes, munis chacun d'un rang de petits granules râpeux; la suture légèrement déprimée de chaque côté de l'épinè scutellaire et munie dans cette dépression de un ou deux rangs de petites squamules jaunes formant deux lignes peu tranchées. Pygidium à ponctuation fine et à pubescence éparse.

Pattes robustes, ponctuées les points sétigères; fémurs claviformes et incruses, les antérieurs peu épais, les intermédiaires davantage, les postérieurs encore beaucoup plus épais; tibias robustes, courts, dróits, dépourvus d'onglet apical; tarses courts et robustes; ongles fortement dentés. Dessous á ponctuation médiocre mais serrée; canal rostral atteignant seulement le bord postérieur des hanches intermédiaires; premier segment ventral et segment anal largement mais peu profondément impressionnés.

Longueur, 2.5 millimètres.

Singapore (*Baker*).

Espèce remarquable par la conformation de ses fémurs, la ponctuation et la carène médiane du prothorax.

Mecysmoderes impressus sp. nov.

Femelle.—Rhomboidal, brun noir, les pattes d'un brun rouge, les antennes jaunes, les élytres glabres et ornés d'une tache postscutellaire, suturale, jaune, formée de petites squamules arrondies et serrées, les points du dessous du corps recouverts par des squamules cendrées, appliquées.

Rostre roux en avant, foncé à la base, mince, modérément arqué, la femelle plus long que la moitié du corps, brillant, éparsément pointillé. Tête à ponctuation grande, serrée, superficielle, le front peu impressionné. Antennes filiformes, longues et insérées vers le tiers basal du rostre (femelle), le deuxième article du funicule plus mince et plus court que le 1er, les suivants graduellement plus courts, la massue oblongue (femelle) ou ovale-oblongue (mâle).

Prothorax subconique, plus large que long, les côtés faiblement arrondis; légèrement etranglé derrière le bord antérieur, la base plus du double aussi large que le bord antérieur, convexe, pourvu d'un canal médian élargi en avant mais n'atteignant pas le sommet, limité en arrière par la carène scutellaire; couvert de grands points serrés, peu profonds anastomosés; caréne scutellaire élevée, vive, noire, atteignant seulement le tiers du prothorax en avant, peu prolongée entre les élytres.

Elytres peu plus longs que larges ensemble entre les épaules, ces dernières très obliques et un peu arrondies; modérément arqués sur les côtés et rétrécis en arrière, largement arrondis isolément au sommet; convexes, sillonnés, les points des sillons brillants et séparés par des intervalles aussi longs que les points; interstries élevés, carénés à leur sommet.

Pattes assez courtes; fémurs linéaires, rugueux, armés d'une petite épinè, tibias rugueux et arqués; tarses robustes et courts.

Dessous assez grossierement ponctué, les intervalles entre les gros points mats, criblées de trés petits points. Pygidium anastomosé.

Longueur, 2 millimètres.

Borneo, Sandakan (*Baker*).

Ressemble à *euglyptus* Gyll. mais plus petit, pattes bien les femurs beaucoup épais, linéderés, etc.

Mecysmoderes carinicollis sp. nov.

Femelle.—Rhomboidal, d'un rouge foncé, les élytres ornés sur la suture, jusqu'en son milieu et de chaque côté de l'épinè scutellaire, sur la base jusqu'au 7^{e} interstrie d'une ligne formée de deux rangs de petites squamules jaunes, la ligne basale un peu prolongée sur les interstries en formant de courtes linéoles basales; les points du dessous tapissés de squamules, oblongues cendrées jaunâtres, très serrées sur les 3^{e}, 4^{e}, 5^{e} segments ventraux, autour des hanches postérieures, formant une tache jaunâtre dans l'angle thoraco-élytral.

Rostre roux, mince, arqué, la femelle plus long que la tête et le prothorax, lisse brillant, éparsément pointillé, le mâle un peu plus court, plus fortement pointillé, substrié à la base. Tête convexe, densément ponctuée, éparsément revêtu de très courtes soies pâles, le front déprimé. Antennes jaunes, fines, les deux premiers articles du funicule très allongés, le 2^{e} très peu plus long que le 1er, ensemble beaucoup plus longs que les 4 autres articles, ces derniers oblongs, la massue ovale-oblongue.

Prothorax subconique, fortement transversal, le bord antérieur avancé sur le vertex; médiocrement convexe, profondément et largement impressionné en arc de chaque côté en avant; à ponctuation forte et rugueuse; pourvu de cinq carènes parallèles, la médiane forte et entière prolongée en arrière par l'épinè scutellaire, les quatre autres s'etendant du bord antérieur jusqu'au milieu, moins fortes et moins régulières, ces carènes séparées entre elles par des sillons; disque glabre, les impressions latérales tapissées de poils squamuleux jaunâtres, assez serrées. Epinè scutellaire prolongèe jusqu'au milieu de le suture.

Elytres ovales-triangulaires, fortement rétrécis en arrière, pas plus longs que larges, les épaules très obliques, le calus huméral saillant et rugueux; moyennement convexes et à peine déprimés en avant, leurs sillons forts, ponctués et glabres, les interstries élevés, ponctués, rugueux, munis de très petites soies jaunes peu visibles. Pygidium éparsement et finement ponctué et squamulé.

Pattes moyennes, les postérieures plus fortes; fémurs armés d'un petite dent aigu, assez densément ponctué, les points sétigères, les fémurs antérieurs et intermédiaires sublinéaires, les postérieurs beaucoup plus épais; tarses robustes et courts.

Dessous à ponctuation assez forte et serree.

Mâle.—Tibias postérieurs et intermédiaires munis d'un très petit onglet apical interne.

Longueur, 2 millimètres.

Borneo, Sandakan (*Baker*). Singapore (*Baker*).

Mecysmoderes obscurus sp. nov.

Ovale rhomboidal, noir brun, mat, à peu près glabre, les élytres ornés d'un linéole suturale et postscutellaire blanche, les points du dessous tapissés de petites squamules cendrées.

Rostre peu arqué, de la longueur du prothorax, assez épais, ponctué, rugueux et striolé â la base, brun, pointillé et un peu brillant au sommet. Tête rugueuse, le front déprimé. Antennes fines, d'un brun de poix, les trois premiers articles du funicule très allongés, le 3^e plus long et aussi long que les 4^e, 5^e, 6^e ensemble, le 4^e conique plus du double aussi long que large, les 5^e et 6^e plus courts et plus larges, la massue oblongue ses sutures bordées d'un dense pubescence cendrée.

Prothorax trapézoidal, un peu moins long que large à la base, les côtés presque rectilignes, légèrement sinués, la base peu arquée de chaque côté et plus du double aussi large que le bord antérieur, ce dernier légèrement relevé et subtronqué au milieu; convexe, légèrement étranglé derrière le bord antérieur, faiblement impressionné latéralement en avant, à ponctuation assez forte et très serrée, subgranuleuse, le sillon médian indiqué seulement en avant. Epinè scutellaire très courte et se prolongeant très peu en avant sur la base du prothorax.

Elytres pas plus longs que larges, assez fortement rétrécis en arrière, les côtés arqués, le calus huméral peu élevé, les sillons forts, leurs points allongés, peu distincts, les interstries larges, convexes, rugueux, revêtus (ainsi que les rugosités du prothorax) d'une pubescence d'un brun foncé, excessivement courte et couchée, la tache scutellaire blanche couvrant presque le tiers de la suture et à peine échancrée en avant par l'épinè scutellaire.

Pattes ponctuées, les points sétigères; fémurs antérieurs et intermédiaires sublinéaires, leur dent petite et aigue, fémurs postérieurs plus épais, claviformes, leur dent à peine visible; tibias arqués, les postérieurs et intermédiaires armés d'un très petit onglet apical interne.

Longueur, 1.7 millimètres.

Singapore (*Baker*).

Mecysmoderes gibbicollis sp. nov.

Mâle.—Rhomboidal, noir brun, peu brillant, à peu près glabre en dessus, les points du dessous et des pattes munis au fond de squamules cendrées très petites, peu visibles, ne voilant pas la coloration foncière des téguments.

Rostre de la longueur du prothorax, peu arqué, robuste, subcylindrique, grossierèment ponctué striolé. Tête couverte de points grands, serrés mais peu profonds; front fortement déprimé. Yeux presque plans. Antennes noires.

Prothorax conique, plus large que long, couvert de gros points serrés, muni en son centre de deux gibbosités élevées, séparées par un large et profond canal, pourvu derrière le bord antérieur d'une grande et profonde impression, occupant plus de la moitié des côtés, interrompue par le canal médian; carène basale vive, élevée mais très courte s'étendant également mais très brièvement entre les élytres et dans le sillon médian du prothorax.

Elytres plus courts que larges ensemble vers le milieu, les épaules obliques, élargis-arrondis de la jusqu'au milieu, peu rétrécis en arrière, largement subtronqués ensemble au sommet où ils sont isolément arrondis en arc peu marqué; modérément convexes, transversalement déprimés le long de la base, le calus huméral élevé et rugueux, l'antéapical effacé; sillonnés, les sillons à points allongés et distant, les interstries costiformes. les 3^e^, 5^e^, 7^e^ plus larges et plus élevés dans leur moitié antérieure, tous plus ou moins découpés transversalement.

Pattes courtes et trés rugueuses; fémurs èpais, linéaires, armés d'un denticule aigu; tibias bruns, larges, comprimés, fortement arqués, particulièrement les postérieurs, ces derniers pourvus d'un petit onglet apical interne; tarses robustes et courts; ongles très petits.

Dessous à ponctuation forte et serrée. Anal rostral squamulé, prolongé jusqu'au bord postérieur du métasternum. Premier segment abdominal largement mais peu profondément impressionné. Pygidium ponctué.

Longueur, 2.4 millimètres.

Borneo, Sandakan (*Baker*).

Espèce remarquable par la conformation du prothorax et les côtés des élytres.

A NEW SPECIES OF CARDINAL FISH FROM THE PHILIPPINES

By Albert W. C. T. Herre

Chief, Division of Fisheries, Bureau of Science, Manila

ONE PLATE

Mionurus bombonensis sp. nov. Plate 1.

Dorsal VI–I, 10 or 9; anal II, 9 or 8; lateral line, 25; 2½ scales above lateral line, 6 or 7 below.

Body compressed, short, thick, and deep, with large head; depth 2.3 to 2.6, head 2.18 to 2.3 in length; the large circular eyes placed very high up, 3.7 to 3.9 in head, equal to or very slightly less than the broad blunt snout; interorbital space rather narrow, flat or nearly so, 4.8 to 5.25 in head; upper lip with a shallow notch into which fits a small elevation on lower lip; maxillary reaches slightly beyond middle of pupil, its posterior extremity enlarged; dorsal and ventral profiles convex, with a nuchal hump at nape; caudal peduncle broad, its least depth 2.7 to 2.8 in head and about 1.2 in its length; origin of first dorsal behind that of the short ventrals, which do not extend quite as far backward as the pectorals do and hardly reach two-thirds the distance to anal; scales large, weakly ctenoid; caudal rounded.

Color in alcohol dusky yellowish or brownish, usually much paler on throat and belly; a large very dark brown spot on caudal peduncle at base of caudal fin; a short diagonal dark brown bar above posterior end of anal fin; top of head dark, and a narrow dusky band extending back as far as second dorsal; the membrane between second and third spines of first dorsal blackish; the remaining portion and the other fins may be more or less darkened by minute specks or may be colorless.

Local name, *mo-ong,* Tagalog.

Here described from the type, No. 10464 Bureau of Science collection, and four cotypes, collected by me in Lake Taal (Laguna de Bombon), Batangas Province, Luzon. The type is 95 millimeters long; the others range down to 75 millimeters.

Laguna de Bombon, often called Taal because of Taal Volcano situated upon an island in it, is a lake about 25 kilometers long and 16 kilometers wide, with a depth of nearly 100 fathoms. It contains a large and interesting fish fauna which has been but little studied.

ILLUSTRATION

Plate 1. *Mionurus bombonensis* sp. nov.

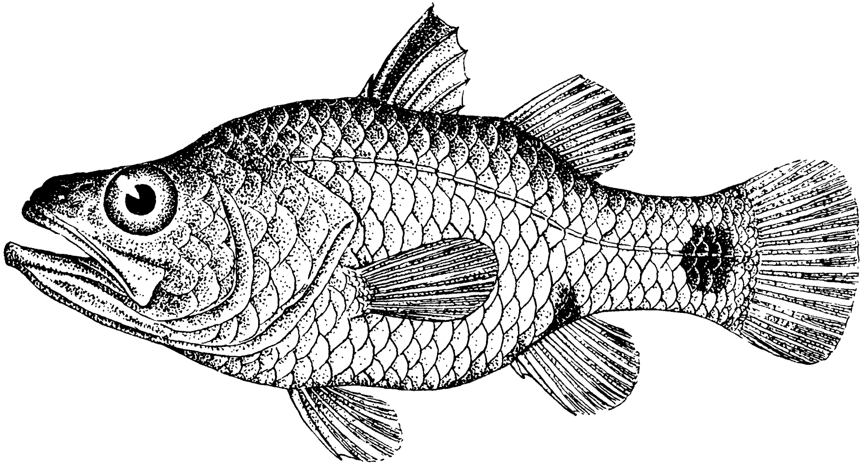

PLATE 1. MIONURUS BOMBONENSIS SP. NOV.

UNIV. OF MICH.

A REVIEW OF THE CARANGOID FISHES FOUND IN THE WATERS OF FORMOSA

By MASAMITSU OSHIMA

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ONE PLATE

Although the carangoid fishes occurring in the waters of Formosa are numerous and are highly valued as food, very few of them have been recorded or fully described.

In 1903, Jordan and Evermann reported eleven species of carangoid fishes from Formosa, as follows:

Scomberoides orientalis (Schlegel) = *Scomberoides tol* (Cuvier and Valenciennes).
Megalaspis cordyla (Linnæus).
Decapterus macrosomus (Bleeker).
Decapterus muroadsi (Schlegel).
Trachurops torva (Jenyns) = *Trachurops crumenophthalmus* (Bloch).
Carangus leptolepis (Cuvier and Valenciennes).
Carangus malabaricus (Schneider).
Carangus jarra (Cuvier and Valenciennes).
Carangus sexfasciatus (Quoy and Gaimard) = *Caranx forsteri* Cuvier and Valenciennes.
Carangus armatus (Forskål).
Alectis ciliaris (Bloch) = *Alectis major* (Cuvier and Valenciennes).

After the publication of Jordan and Synder's [1] paper on three new species of Formosan carangoid fishes, Jordan and Richardson enumerated twenty-three species, including all the known species of Carangidæ from the waters of Formosa.

In addition to these, Hidemi Seno,[2] fisheries expert to the Imperial Japanese Government, reported the following four unrecorded species, raising the total number from twenty-three to twenty-seven.

Decapterus maruadsi (not of Schlegel) = *Decapterus kurra* (Cuvier and Valenciennes).
Trachurops japonicus Temminck and Schlegel = *Trachurus trachurus* (Linnæus).

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[1] Mem. Carnegie Mus. 4 (1909) 37–40.

[2] Report on the Fisheries of Formosa (1910) 117–119.

Caranx armatus (not of Forskål) = *Citula pescadorensis* sp. nov.
Alectis ciliaris (Bloch).

The present paper is a descriptive catalogue of the carangoid fishes known to inhabit the waters of Formosa, with descriptions of the following two new and ten unrecorded species. It is based on the material obtained by me mainly at the Taihoku fish market. A series of the specimens examined is in the Museum of the Government Research Institute, Formosa, Japan.

NEW SPECIES

Scomberoides formosanus sp. nov.
Citula pescadorensis sp. nov.

UNRECORDED SPECIES

Seriola purpurascens Temminck and Schlegel.
Elagatis bipinnulatus (Quoy and Gaimard).
Decapterus kurroides Bleeker.
Decapterus maruadsi (Temminck and Schlegel).
Caranx hippos (Linnæus).
Caranx cynodon Bleeker.
Alepes helvolus (Forster).
Carangoides hemigymnostethus Bleeker.
Carangoides equula (Temminck and Schlegel).
Alectis gallus (Linnæus).

In the systematic arrangement of these forms I have followed Jordan and Bleeker, especially the latter, adopting his generic names in the case of subdividing the genus *Caranx*. *Lactarius*, as observed by Günther,[3] approaches the family Sciænidæ in several characteristics. Therefore, *Lactarius lactarius*, obtained at the Tainan fish market, has been purposely omitted from the present paper.

CARANGIDÆ

Body more or less compressed and often elevated, sometimes naked, or more usually covered with small, thin, cycloid scales; head compressed, the occipital keel prominent, usually trenchant; mouth of varying size, the dentition various, the teeth generally small; premaxillaries usually protractile; maxillary with or without a supplemental bone; preopercle usually entire in the adult, in the very young armed with three or more spines; lateral line complete, anteriorly arched, the posterior part straight, sometimes armed with bony plates; dorsal fin more or less separated, the spinous part rather weak, the spines usually depressible in a groove; anal fin long, similar to the soft dorsal, always preceded by two stiff spines, usually separate, but in the young often more or less connected with the fin or with each other; these sometimes disappear with old age, and sometimes the spinous dorsal also vanishes; often a procumbent spine before the dorsal fin; ventral fins thoracic, well developed, I, 5; caudal peduncle very slender, the fin widely forked; pectoral fins narrow; gill openings very wide, the membranes usually not united, free from the isthmus; gills 4, a slit behind the last; gill rakers usually long; branchiostegals commonly 7; air bladder present, often bifurcate behind; pseudobranchiæ large, sometimes disappearing with age, œsophagus unarmed; pyloric cæca generally numerous; vertebræ fewer than in the Scombridæ, usually $10 + 14 = 24$; first superior pharyngeal without teeth; second, third, and fourth separate, with teeth; lower pharyngeals separate.

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[3] Cat. Fishes 2 (1860) 507.

Coloration generally metallic and silvery or golden. Abounding in warm seas, often moving northward in summer, like the Scombridæ. They swim swiftly, often with the dorsal above the surface of the water. Most of the species are widely distributed, and nearly all are valued as food.

Key to genera of Carangidæ.

a^1. Premaxillaries not protractile. The spinous dorsal formed by isolated spines in small number. Posterior rays of the dorsal and anal fins semidetached, forming finlets.......... **Scomberoides.**
a^2. Premaxillaries protractile.
  b^1. Anal fin much shorter than soft dorsal, its base not shorter than abdomen. Pectoral fin short, not falcate; maxillary with a distinct supplemental bone. Dorsal spines low and weak.
    c^1. Dorsal and anal fins without finlets. Membrane of dorsal spines persistent; preorbital of moderate height; abdomen rounded; preoperculum entire .... **Seriola.**
    c^2. Dorsal and anal fins each with a detached two-rayed finlet. **Elagatis.**
  b^2. Anal fin about as long as soft dorsal, its base longer than abdomen.
    c^1. Maxillary with a supplemental bone; lateral line arched anteriorly, usually armed posteriorly; pectoral long, falcate.
      d^1. Dorsal and anal with one or more detached finlets.
        e^1. Dorsal and anal fins each with a single detached finlet. **Decapterus.**
        e^2. Dorsal and anal fins each with eight or nine detached finlets. **Megalaspis.**
      d^2. Dorsal and anal without finlets.
        e^1. Lateral line with well-developed scutes for its entire length; body elongate .... **Trachurus.**
        e^2. Lateral line with scutes on its straight portion only.

f^1. Shoulder girdle with a deep cross furrow at its junction with isthmus, above which is a fleshy projection; body elongate. **Trachurops.**

f^2. Shoulder girdle normal, its surface even; body deeper.

g^1. Teeth of jaws in series or in villiform bands.

h^1. Teeth of jaws in one or few series, unequal, outer series above usually enlarged, the lower teeth usually uniserial.

i^1. Maxillary broad; head rather large; teeth in upper jaw in several series, outer one larger; lower jaw with a single series of teeth, anterior two or four caninelike; vomer, palatines, and tongue with bands of villiform teeth.. **Caranx.**

i^2. Teeth of both jaws in a single series, subequal in size.

j^1. Vomer, palatines, and tongue with bands of villiform teeth .... **Selar.**

j^2. Teeth on vomer, palatines, and tongue none or few. **Alepes.**

i^3. Upper jaw, vomer, and palatines edentulous; lower jaw with a single series of teeth; a fine band of villiform teeth on tongue.................................. **Leptaspis.**

h^2. Teeth of jaws form villiform bands; maxillary broad; body compressed; spinous dorsal weak, usually disappearing with age.

i^1. Soft dorsal with none of its rays produced in filaments; teeth equal, several series in both jaws and on palate and vomer; lateral line nearly straight; body oblong .... **Carangoides.**

i^2. Soft dorsal with one to six rays produced in filaments.

j^1. Body moderately compressed, ovate; spinous dorsal more or less persistent; first ray of soft dorsal prolonged into a filament............................ **Citula.**

j^2. Body deep, greatly compressed, rhomboidal, its edges all trenchant; anterior rays of soft dorsal and anal filamentous, extending beyond tip of caudal .... **Alectis.**

g^2. Teeth none, very small, or granular, entirely disappearing with age.

h^1. Gill rakers elongate, but normal............. **Gnathanodon.**

h^2. Gill rakers long and numerous, projecting upward and forward along sides of mouth and base of tongue, lateral margin ciliated.. **Ulua.**

c^2. Maxillary without supplemental bone; anal fin similar to soft dorsal, its base much longer than abdomen; tail unarmed; pectoral short, not falcate; spinous dorsal formed by spines in small number. Forehead convex; tail small or deciduous.. **Trachinotus.**

Genus **SCOMBEROIDES** Lacépède

Scomberoides LACÉPÈDE, Hist. Nat. Poiss. 3 (1801) 50 (type, *Scomberoides commersonianus* Lacépède = *Scomber lysan* Forskål).
Chorinemus CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1831) 367 (type, *Scomberoides commersonianus* Lacépède).

Body compressed, oblong or lanceolate; caudal peduncle slender, not keeled; head short, compressed, acute; occipital keel sharp; mouth rather large, with small, sharp teeth in bands on jaws, tongue, vomer, palatines, and pterygoids; jaws about equal, the upper not protractile, except in the very young in which it is movable as in other Carangidæ; maxillary very narrow, with a supplemental bone; gill rakers rather long; scales rather narrow, but more or less normally developed, embedded in the skin in different angles; lateral line unarmed; dorsal spines rather strong, seven in number, nearly free in the adult; second dorsal very long, its posterior rays penicillated and nearly or quite disconnected, forming finlets; anal rather longer than soft dorsal, much larger than abdomen, its last rays forming similar finlets; anal spines strong; ventral fins depressible in a groove; pectoral fins very short. Species few.

Key to species of Scomberoides Lacépède.

a^1. Dorsal spines rounded; maxillary scarcely reaches a vertical through posterior border of pupil; outer row of teeth in lower jaw curved upward and outward.
  b^1. Coloration uniform, with no black spots; eye large, its diameter nearly as long as snout; soft dorsal inserted midway between tip of snout and base of caudal.. **S. formosanus.**
  b^2. Sides with a series of six or eight black blotches above lateral line; eye moderate, its diameter shorter than snout; soft dorsal inserted midway between anterior edge of eye and base of caudal........ **S. tol.**
a^2. Dorsal spines flattened; maxillary reaches a vertical through anterior border of pupil; outer row of teeth in lower jaw directed upward, not curved. Sides with a series of five or six black blotches above lateral line; soft dorsal inserted midway between tip of snout and base of caudal.. **S. sancti-petri.**

Scomberoides formosanus sp. nov. Plate 1, fig. 1.

Head 4.5 in length; depth 3.6; dorsal VII, 1, 20; anal II, 1, 18; pectoral 16; ventral 5; snout 3.27 in head; eye 3.27; interorbital space 3.27; depth of caudal peduncle 4.5; pectoral 1.8; ventral 2.57.

Body fusiform, strongly compressed; dorsal and ventral outlines equally arched, deepest in front of the soft dorsal; head moderate, top convex, nape forms a weak keel extending to interorbital space; snout rather short, as long as diameter of eye, conical, rather sharply pointed anteriorly; interorbital space strongly convex, median dorsal line weakly keeled; mouth large, oblique; lower jaw slightly protruding beyond upper; maxillary with a flat, triangular supplemental bone, which reaches a vertical through posterior border of pupil; bands of villiform teeth on vomer, palatines, and tongue; upper jaw with a single series of roughly beset, minute, canine teeth, teeth on lower jaw in two series, those of outer series setiform, stronger, curved and bent outward, mandibular symphysis with several incurved canine teeth, much stronger than the others; eye moderate, anterior on median line; nostrils close together, situated midway between tip of snout and orbit above; gill rakers 8 + 18, slender, longest one nearly one and a half times as long as diameter of pupil.

Dorsal spines low, not flattened, fifth the longest, 2.77 in head, much longer than diameter of eye, tip of last spine when depressed scarcely reaching origin of soft dorsal; a recumbent spine before spinous dorsal; soft dorsal slightly elevated anteriorly, longest ray 1.8 in head; caudal deeply forked, lobes equal, with sharply pointed tip; anal similar to soft dorsal, inserted just below origin of latter, longest ray 2.57 in head; pectorals not reaching tip of ventrals; ventrals inserted below lower end of pectoral base.

Scales lanceolate, closely adherent to skin; lateral line straight from origin of soft dorsal below to base of caudal, running along middle of body, upcurved anteriorly above pectoral, ascending to origin of spinous dorsal below and abruptly bending downward to upper part of operculum.

Coloration uniform, with no black spots on sides; back bluish gray; lower part of sides silvery; outer margin of soft dorsal blackish; all fins whitish.

Total length, 91 millimeters. Described from a specimen obtained at Keelung on August 18, 1922.

Habitat.—Keelung; Tôkô.

Remarks.—Closely related to *Scomberoides orientalis* (Temminck and Schlegel), differing from it in having much larger eye, diameter of which equals the length of snout.

Jordan and Evermann's *Scomberoides orientalis*[4] from Giran, which was united with *Scomberoides tol* by Jordan and Richardson in 1909, seems to be identical with the present species.

I obtained a fine specimen from Tôkô, which is much larger than the type (total length, 182 millimeters).

Scomberoides tol (Cuvier and Valenciennes).

Chorinemus tol CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1831) 385; BLEEKER, Verh. Bat. Gen. 24 (1852) 45, Molucca Islands; GÜNTHER, Cat. Fishes 2 (1860) 473, East Indian seas; DAY, Fishes of Malabar (1865) 93; KLUNZINGER, Fische des Rothen Meeres (1884) 106, Red Sea; WEBER, Fische Siboga Exp. (1913) 390, Red Sea to Indo-Australian Archipelago.

Scomberoides tol JORDAN and SNYDER, Annot. Zool. Jap. 3 (1901) 66, Nagasaki; FOWLER, Proc. Acad. Nat. Sci. Phila. (January, 1905) 59, Sumatra; JORDAN and RICHARDSON, Bull. U. S. Bur. Fisheries 27 (1907) 249, Philippine Islands; Check-list Philip. Fishes (1910) 19, Cavite, P. I.; JORDAN and THOMPSON, Mem. Carnegie Mus. 4 (1909) 178, Giran, Formosa.

Chorinemus moadetta DAY, Fishes of India (1876) 230, Red Sea, east coast of Africa, seas of India (not of Cuvier and Valenciennes).

Head 5.67 to 5.75 in total length; depth 5.5; dorsal VII, 1, 21; anal II, 1, 18–19; pectoral 19; ventral 1, 5; branchiostegals 8; eye 4.5 to 5 in head, 1.25 in snout and interorbital space.

Dorsal profile rather more convex than that of abdomen, and rather concave above orbits, the central and lateral ridges on summit of head well developed. Lower jaw somewhat longer, cleft of mouth commences opposite middle of eyes, maxilla (which is uncovered from beneath first third of eyes) reaches to beneath last third of orbit. Greatest depth of preorbital equals one-third of diameter of orbit. Teeth in premaxillaries in a single row, the two anterior ones large and rather caninelike, posterior to these are some villiform ones; teeth in lower jaw in two rows, the outer row curved rather outward and upward, while there are enlarged ones on either side of symphysis; an elongated oval patch on vomer having an anterior-posterior direction; in a long pyriform band on palate, largest anteriorly; also on tongue.

Dorsal spines rounded, not flattened, overlapping and twisting laterally when elevated; second dorsal commences midway between anterior edge of eye and base of caudal fin, its first portion the highest, $2\frac{1}{3}$ times as high as first part of anal; pectoral as long as head behind middle of eye; ventral reaches two-fifths of the way to anal; caudal deeply forked.

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[4] Proc. U. S. Nat. Mus. 25 (1903) 336.

Scales are peculiar, resembling needles sharp at both ends, lying close together and interdigitating, only near the free portion of tail do they become at all scalelike; lateral line rather indistinct and almost straight, making one slight angular elevation above the last third of pectoral.

Color silvery along upper third of body, becoming white on sides and below, a series of six or eight blotches along sides, mostly above lateral line; a black blotch at highest point of second dorsal and the ends of either lobe of caudal; the other fins yellow. (*Day.*)

Habitat.—Red Sea, east coast of Africa, and seas of India. Not seen.

Five specimens from Takao, 10 inches long (*Jordan and Richardson*).

Remarks.—Francis Day[5] described the present species under the name *Chorinemus moadetta* Cuvier and Valenciennes. According to Günther, Bleeker, and Weber, *Chorinemus tol* Cuvier and Valenciennes and *Chorinemus moadetta* Cuvier and Valenciennes are different species, the latter being a synonym of *Chorinemus sancti-petri* Cuvier and Valenciennes (*Scomberoides sancti-petri*). Day's *moadetta* is essentially identical with *Chorinemus tol* described by Bleeker and by Klunzinger. Therefore, I copied the description of *Chorinemus moadetta* given by Francis Day.[5] Kner's *Chorinemus tol* from Java, Madras, and Ceylon is a different species, having flattened dorsal spines.

Scomberoides sancti-petri (Cuvier and Valenciennes).

Chorinemus sancti-petri CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1831) 379, pl. 236, Malabar; BLEEKER, Nat. & Geneesk. Arch. Ned. Ind. 2 (1845) 516; Verh. Bat. Gen. 23 (1850) 8, Java; Nat. Tijdschr. Ned. Ind. 2 (1851) 212, Celebes; 471, Riouw; Verh. Bat. Gen. 24 (1852) 237, Molucca; 45, Sunda-Molucca Islands; 25 (1853) 44, Bengal; Nat. Tijdschr. Ned. Ind. 11 (1856) 469, Saparoa; 16 (1858) 407, Japara; 18 (1858) 146, Bali; 366, Banka; Act. Soc. Sci. Indo-Neerl. 8 (1860) 28, Sumatra; 38, Celebes; Versl. Akad. Amsterdam 14 (1862) 109, Batan; Ned. Tijdschr. Dierk. 1 (1863) 156, Halmahera; GÜNTHER, Cat. Fishes 2 (1860) 473, from eastern shore of Africa to East Indian seas; DAY, Fishes of India (1876) 230, Red Sea, east coast of Africa, seas of India, to Malay Archipelago; GÜNTHER, Fische der Südsee 5 (1876) 138, Kingsmill, Samoa, Society, Hawaiian Islands.

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[5] Fishes of India (1876) 230.

Scomberoides sancti-petri JORDAN and SNYDER, Annot. Zool. Jap. 3 (1901) 66, Nagasaki; JENKINS, Bull. U. S. Fish Comm. 22 (1902) 442, Honolulu; JORDAN and EVERMANN, Bull. U. S. Fish Comm. 23: 181, Honolulu; SNYDER, Bull. U. S. Fish Comm. 22 (1904) 523, Hawaiian Islands; SEALE, Occ. Papers Bishop Mus. No. 1 4 (1906) 30, South Pacific; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 25 (1906) 229, Samoa; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 178, Takao, Formosa; SNYDER, Proc. U. S. Nat. Mus. 42 (1911) 496, Riu-Kiu.

Chorinemus moadetta CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1831) 382.

Chorinemus mauritianus CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1831) 382.

Head 5 in length; depth 3.9; dorsal VII, 1, 21; anal II, 1, 19; pectoral 17; ventral 5; snout 3.48 in head; eye 4.22; interorbital space 3.48; pectoral 1.74; ventral 1.86; maxillary 2.1; depth of caudal peduncle 5.

Body fusiform, elongate, strongly compressed, deepest in front of soft dorsal, dorsal and ventral outlines equally arched, back with a median keel from root of spinous dorsal, extending forward to interorbital space; head rather small, conical, dorsal outline slightly concave; snout much longer than diameter of eye, sharply pointed anteriorly; jaws subequal, lower very slightly projecting beyond upper; mouth oblique, its angle reaching a vertical through anterior margin of pupil; supplemental bone of maxillaries flat and triangular; teeth in the premaxillaries in a single row, few in number, more or less caninelike, bands of villiform teeth on vomer, palatines, and tongue, upper jaw with a single row of small caninelike teeth, banded anteriorly, those on lower jaw slightly larger and in two rows, more or less banded and becoming larger anteriorly, one pair of triangular teeth on either side of symphysis; eye anterior, in median line, surrounded by thin adipose eyelid; nostrils close together, minute, occupying the space midway between tip of snout and eye; gill openings moderate, membranes entirely separated; gill rakers 7 + 17, longest ones one and a half times as long as diameter of pupil.

Dorsal spines flat, with a keel along center, overlapping, broad and low, longest reaching origin of soft dorsal; soft dorsal elevated anteriorly, longest ray 2.1 in head, tenth ray to the last forming finlets; caudal deeply forked, lobes equal and sharply pointed; anal similar to soft dorsal but lower, its first ray under origin of soft dorsal, 3.07 in head; ventrals slender, not reaching vent; pectorals small, the posterior base above root of ventrals.

Body nearly smooth, scales narrow and elongate, rhomboidal, tip sharply pointed; lateral line nearly straight, running along middle of sides, anterior part slightly upcurved above pectoral.

Color in alcohol bluish silvery above; lower parts of sides silvery and whitish; six black spots larger than pupil above lateral line, extending beyond origin of soft dorsal; a bluish black streak from nostrils to upper part of operculum, broadening posteriorly; anterior part of soft dorsal margined with black, tip of each dorsal ray grayish; caudal dusky; other fins pale.

Total length, 235 millimeters. Described from a specimen from Tôkô, collected in April, 1920.

One specimen (200 millimeters long) from the Tainan fish market; four from Tôkô. Largest one, 401 millimeters in total length.

Habitat.—Red Sea, east coast of Africa, Malay Archipelago, to Sandwich Islands.

Remarks.—Hawaiian species described by Jordan and Evermann differ slightly from the Formosan forms in having a longer head. Day's *Chorinemus sancti-petri* from India is provided with a slightly longer maxillary which reaches to beneath hind edge of orbit.

Genus **SERIOLA** Cuvier

Seriola CUVIER, Regne Anim. (1817) 315 (type, *Caranx dumerili* Risso).

Micropteryx AGASSIZ, Pisc. Brasil. (1829) 102 (type not named). A substitute for *Seriola*, preoccupied in botany.

Halatractus GILL, Proc. Acad. Nat. Sci. Phila. (1862) 442 (logotype, *Seriola dumerili* Cuvier and Valenciennes). A substitute for *Seriola*, preoccupied in botany.

Zonichthys SWAINSON, Nat. Hist. Class. Fishes 2 (1839) 248 (type, *Scomber fasciatus* Bloch). A section or subgenus under *Seriola*.

Lepidomegas THOMINOT, Bull. Sci. Philom. Paris 4 (1880) 173 (type, *Lepidomegas muelleri* Thominot).

Body oblong, moderately compressed, not elevated. Occiput and breast not trenchant. Head usually more or less conical, not very blunt. Mouth comparatively large, with broad bands of villiform teeth on both jaws, tongue, vomer, and palatines; a broad, strong, supplemental maxillary bone; premaxillaries protractile. Scales small; lateral line scarcely arched, forming a keel on caudal peduncle, not armed with bony plates; sides of head with small scales. First dorsal with about seven low spines, connected by membrane; second dorsal very long, elevated in front; anal similar to soft dorsal but not nearly so long, shorter than abdomen, preceded by two very small free spines, which disappear in old fishes; no finlets; ventral fins very long, pectorals short and broad. Gill rakers moderate. Species of moderate or large size, often gracefully colored, most of them valued as food fishes.

Seriola purpurascens Temminck and Schlegel.

Seriola purpurascens TEMMINCK and SCHLEGEL, Fauna Japonica, Poiss. (1845) 116, Nagasaki; BLEEKER, Verh. Bat. Gen. 26 (1857) 103, Japan; Verh. Akad. Amsterdam 18 (1879) 14, Japan; JORDAN and SNYDER, Proc. U. S. Nat. Mus. 23 (1901) 352, Yokohama; JORDAN and STARKS, Bull. U. S. Fish Comm. 22 (1904) 585, Sagami Bay; SNYDER, Proc. U. S. Nat. Mus. 42 (1912) 411, Tokyo, Misaki, and Kagoshima market; JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo 33 (1913) 127, coast of Japan; JORDAN and THOMPSON, Mem. Carnegie Mus. 6 (1914) 240, Sagami Bay.

Seriola dumerilii GÜNTHER (not of Risso), Cat. Fishes 2 (1860) 462, Japan (one part); KNER, Novara, Fische (1867) 161, Manila.

Japanese names: *Hiramasa, kanpachi, shiwo, akaburi* (Japan); *akaba* (Taihoku, Formosa).

Head 3.55 in length; depth 3.05; snout 2.8 in head; eye 4.3; interorbital space 2.95; maxillary 2.25; dorsal VII, 1, 31; anal II, 1, 20; pectoral 2.1; ventral 1, 56; scales about 200 in lateral line.

Body rather long, fusiform, not much compressed, deepest in front of soft dorsal, dorsal and ventral outlines equally arched; head rather short, conical, top strongly convex; snout long, more or less pointed anteriorly; mouth large, slightly oblique, its angle scarcely reaching a vertical through anterior border of pupil, supplemental bone large; jaws subequal; teeth in villiform bands on jaws, vomer, palatine, and tongue; eye rather small, slightly superior and anterior, adipose eyelid moderately developed, covering outer part of eye; interorbital space broad, strongly convex, nape very slightly depressed; nostrils close together, situated between tip of snout and eye above, anterior nostril in a short tube with a cutaneous flap, the posterior much smaller than the former; preopercle entire; least depth of caudal peduncle 5.65 in head; gill rakers fifteen on first arch, rather strong and compressed, the longest one nearly as long as diameter of pupil.

Spinous dorsal low, the rays short and weak, third spine the longest, 4.75 in head, first nearly half as long as second, third to fifth spines much stronger, seventh rudimentary, separated; soft dorsal low and elongate, anterior rays elevated, highest one 2.37 in head; anal similar to soft dorsal but much shorter, first ray the longest, 2.8 in head, base of fin nearly as long as abdomen; caudal deeply forked, lobes slender and equal, tip sharply pointed; pectorals rather short, with twenty-two rays; ventrals inserted below root of pectoral, reaching halfway to vent.

Body covered with very small scales; cheek and upper part of opercle densely scaled, rest of head naked; breast closely scaled; lateral line gradually upcurved above pectoral, running along middle of tail; scutes scarcely developed, perceptible only on caudal peduncle.

Coloration uniform; back purplish gray, paler and silvery below; lower part of sides and underpart yellowish silvery; spinous dorsal and ventrals gray, rays yellowish; soft dorsal and anal fins greenish yellow, margined with black; pectorals and caudal yellowish gray.

Total length, 380 millimeters. Described from a specimen obtained at Taihoku fish market on November 7, 1922.

Habitat.—Coast of Japan (Sagami Bay; Yokohama; Tokyo; Misaki; Nagasaki; Kagoshima); Formosa (Keelung; Takao); China.

Remarks.—The present species is commonest in Formosa during the winter time and is valued as a food fish. It grows to a large size.

Origin of spinous dorsal commences in a vertical behind base of pectoral, instead of being situated at base of pectoral above.

Genus **ELAGATIS** Bennett

Elagatis BENNETT, Narr. Whaling Voyage 2 (1840) 283 (type, *Seriola bipinnulata* Quoy and Gaimard).

Seriolichthys BLEEKER, Nat. Tijdschr. Ned. Ind. 6 (1854) 196 (type, *Seriola bipinnulata* Quoy and Gaimard).

Decaptus POEY, Mem. Cuba 2 (1861) 391 (type, *Seriola pinnulata* Poey).

Body oblong, compressed, with abdomen rounded, covered with small cycloid scales. Cleft of mouth moderate; preopercle slightly crenulated or entire. Villiform teeth on jaws, vomer, and palatines, as well as on tongue. The spinous dorsal continuous; soft dorsal and anal much more developed, with a detached finlet posteriorly; a pair of preanal spines remote from rest of fin may be present or absent. Lateral line unarmed. Branchiostegals seven.

Geographical distribution.—East Indian Archipelago; Polynesia.

Elagatis bipinnulatus (Quoy and Gaimard).

Seriola bipinnulata QUOY and GAIMARD, Voy. Uranie 1 (1824) 363, pl. 61, fig. 3, Isles of Papous, or the archipelago between New Guinea and Celebes; CUVIER, Regne Anim., Poiss. 3 (1834) 130.

Elagatis bipinnulatus BENNETT, Narr. Whaling Voyage 2 (1840) 283, Pacific Ocean, Indian Archipelago; JORDAN and EVERMANN, Report U. S. Fish Comm. (1896) 344, West Indies, tropical seas of America, Long Island; JORDAN and SNYDER, Annot. Zool. Jap. 3 (1901) 67, Nagasaki; JORDAN and EVERMANN, Bull. U. S. Fish Comm. (1903) 185, Honolulu; FOWLER, Proc. Acad. Nat. Sci. Phila. 12 (1904) 507, Sumatra; (1905) 65, Sumatra; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 25 (1906) 229, Hawaii, Solomon Islands, East Indies, West Indies; SEALE, Occ. Papers Bishop Mus. No. 1 4 (1906) 30, Polynesian Islands; JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo 33 (1913) 127, tropical seas.

Seriolichthys bipinnulatus BLEEKER, Nat. Tijdschr. Ned. Ind. 6 (1854) 196; 15 (1858) 459, Cocos Island; Act. Soc. Indo-Neerl. 8 (1860) 39, Celebes; Ned. Tijdschr. Dierk. 2 (1865) 289, Amboina; Rech. Fauna Madagascar (1875) 100, Madagascar; Arch. Neerl. Sci. Nat. 13 (1878) 50, New Guinea; GÜNTHER, Cat. Fishes 2 (1860) 468, Amboina; KLUNZINGER, Verh. z. b. Ges. Wien (1871) 452; DAY, Fishes of India (1876) 228, seas of India.

Seriolichthys lineolatus DAY, Proc. Zool. Soc. London (1867) 559, Madras.

Japanese name: *Tsumu-buri.*

Head 4.12 in length; depth 4.25; dorsal VI, I, 25 + I; anal 0, I, 17 + I; pectoral 20; ventral 5; snout 2.55 in head; eye 4.9; interorbital space 2.8; maxillary 3.2; pectoral 1.8; ventral 1.74; scales about 105.

Body oblong, fusiform, more or less pointed, dorsal and ventral outlines equally arched; head moderately long, pointed, top strongly convex; snout long, conical, acutely pointed anteriorly; upper jaw slightly shorter than lower; mouth rather small, slightly oblique, its angle reaching a vertical through nostrils; supplemental bone of maxillary elongate, triangular; teeth in broad villiform bands on jaws, vomer, palatines, and tongue; eye moderate, slightly anterior; adipose eyelid well developed but not covering pupil; interorbital space broad, strongly convex; nostrils small, close together, situated midway between tip of snout and orbit; preopercle and opercle entire; gill rakers 5 + 25, flat and horny, longest about 1.46 in eye.

Origin of spinous dorsal in advance of tip of pectoral, continuous and low, spines weak and short, folded in a groove, longest 5.25 in head, fin not connected with soft dorsal; soft dorsal long and low, anterior rays elevated, longest 2.55 in head;

dorsal finlet consists of two rays, last one produced, its length 3.7 in head; distance from last ray of finlet to base of caudal lobe 3.9 in head; pectoral short, not falcate; ventrals inserted below hind part of pectoral base, rather short; anal similar to soft dorsal but much shorter and lower, inserted below thirteenth dorsal ray, anterior rays slightly elevated, longest 3.2 in head; caudal very deeply forked, lobes long and slender.

Body covered with small, thin, cycloid scales; head naked except cheek and upper posterior part of operculum, scales on nape and antedorsal region smaller; lateral line smooth, well developed, very slightly upcurved above pectoral, running along middle of sides.

Color in alcohol dark blue above, becoming somewhat paler below; underparts dirty white; fins dusky. In life two conspicuous blue bands on sides of body, the upper beginning at orbit and passing to dorsal margin of caudal peduncle, the other beginning at snout and passing along lower margin of orbit across opercle and above pectoral fin to caudal; ventrals with bluish color.

Total length, 378 millimeters. Described from a specimen from the Taihoku fish market.

Habitat.—Locality unknown. Distributed from the east coast of Africa to Sandwich Islands. The fishes of this species attain several feet in length.

Genus **DECAPTERUS** Bleeker

Decapterus BLEEKER, Nat. Tijdschr. Ned. Ind. 1 (1851) 358 (type, *Caranx kurra* Cuvier and Valenciennes).

Eustomatodus GILL, Proc. Acad. Nat. Sci. Phila. (1862) 261 (type, *Decapterus kurroides* Bleeker).

Body elongate, little compressed, almost perfectly fusiform; head short, pointed. Mouth rather small; jaws subequal; dentition feeble. Maxillary rather broad, with a supplementary bone; premaxillaries protractile. Scales moderate, enlarged for the whole length of lateral line, but spinous and bony posteriorly only. Soft dorsal and anal with a single detached finlet; free anal spines very strong; spinous dorsal well developed, persistent; pectorals comparatively short. Abdomen rather shorter than anal fin. Gill rakers long and slender. Species numerous.

Geographical distribution.—From Red Sea to Hawaiian Islands; Galapagos Islands; West Indies; tropical parts of the Atlantic Ocean; on both coasts of South America; St. Helena.

Key to species of Decapterus Bleeker.

a^1. Soft dorsal with 29 to 31 rays.
  b^1. Depth of body less than 6 in total length; anal fin with 26 rays.
    c^1. Keeled scutes 28 .... **D. muroadsi.**
    c^2. Keeled scutes 36 to 40 .... **D. kurra.**
  b^2. Depth of body more than 6 in total length; anal fin with 24 rays. Keeled scutes 30 .... **D. kurroides.**
a^2. Soft dorsal with 33 to 36 rays.
  b^1. Depth of body less than 6 in total length; keeled scutes 33. **D. maruadsi.**
  b^2. Depth of body more than 6 in total length; keeled scutes 60. **D. macrosomus.**

Decapterus muroadsi (Temminck and Schlegel).

Caranx muroadsi TEMMINCK and SCHLEGEL, Fauna Japonica, Poiss. (1844) 108, pl. 58, fig. 1, Nagasaki; GÜNTHER, Cat. Fishes 2 (1860) 425, seas of Japan; KNER, Novara, Fische (1865) 151, Nicobar.

Decapterus muroadsi BLEEKER, Verh. Bat. Gen. 26 (1854) 101, Japan; Ned. Tijdschr. Dierk. 4 (1873) 131, China; Verh. Akad. Amsterdam 18 (1879) 14, Japan; JORDAN and SNYDER, Annot. Zool. Jap. 2 (1901) 67, Yokohama, Nagasaki; JORDAN and EVERMANN, Proc. U. S. Nat. Mus. 25 (1903) 336, Formosa; JORDAN and RICHARDSON, Mem. Carnegie Mus. No. 4 4 (1909) 178, Formosa; SNYDER, Proc. U. S. Nat. Mus. 42 (1912) 411, Tokyo, Misaki; JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo 33 (1913) 128, Tokyo to Nagasaki.

Japanese name: *Muroaji.*

Dorsal VIII, 1, 31 + I; anal II, 1, 26 + I; scutes 28.

The teeth in jaws minute, forming a single series; teeth on vomer, palatine bones, and on tongue. Height of body 6.5 in total length, length of head 4.67. Snout about equal in length to diameter of eye, lower jaw a little longer than upper; maxillary reaches to, or scarcely to, the vertical from anterior margin of eye. Breast scaly; lateral line very slightly bent, becoming straight below tenth dorsal ray. Opercular spot blackish; top of soft dorsal brown. (*Günther.*)

Not seen by me.

Habitat.—Seas of Japan and China.

Decapterus kurra (Cuvier and Valenciennes).

Caranx kurra CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1828) 44; GÜNTHER, Cat. Fishes 2 (1860) 427, Sea of Batavia, Moluccas; DAY, Fishes of Malabar (1865) 81, Malabar; KLUNZINGER, Verh. z. b. Ges. Wien (1871) 453, Red Sea; DAY, Fishes of India (1876) 214, pl. 48, fig. 5, from Red Sea to the Malay Archipelago.

Decapterus kurra BLEEKER, Nat. Tijdschr. Ned. Ind. 1 (1851) 358, Indian Archipelago; 213, Celebes; Verh. Bat. Gen. 24 (1852) 50, Moluccas; 25 (1853) 44, Bengal; Nat. Tijdschr. Ned. Ind. 8 (1855) 303, Ternate; Act. Soc. Sci. Indo-Neerl. 8 (1860) 39, Celebes; JORDAN and SEALE, Bull. U. S. Fish Comm. 26 (1906) 63, Philippines; JORDAN and RICHARDSON, Check-list Philip. Fishes (1910) 19, Bulan, Philippines.

Caranx pseudopterygius BLEEKER, Journ. Ind. Arch. 3 (1849) 71, Celebes.

Decapterus maruadsi SENO, Report Formosan Fisheries (1910) 117, pl. 8, fig. 3 (not of Schlegel).

Head 3.7 in length; depth 4.35; dorsal VIII, 1, 30 + I; anal II, 1, 26 + I; pectoral 21; ventral 5; snout 3.2 in head; eye 3.75; interorbital space 3.75; maxillary 3; pectoral 1.12; ventral 1.96; scutes 36; scales 57.

Body oblong, fusiform, slightly compressed, ventral outline a little more convex than dorsal; head moderate, pointed, top with weak, median keel, not extending to interorbital space; snout long, obtusely pointed anteriorly; mouth oblique, its angle scarcely reaching a vertical through nostrils; supplemental bone of maxillary thin, elongate, triangular; lower jaw longer than upper; teeth on both jaws minute, in a single series; vomer, palatines, and tongue with bands of villiform teeth; eye moderate, slightly anterior and superior; adipose eyelids well developed, covering posterior part of pupil; nostrils close together, superior; preorbital with three raised ridges radiating from its center; gill rakers 12 + 35, slender and long, longest 1.72 in eye.

Spinous dorsal higher than soft dorsal, spines of moderate strength, third the longest, 1.73 in head; soft dorsal inserted midway between tip of snout and base of caudal, elongate and low, anterior rays elevated, longest 2.44 in head, posterior rays short and folded in a groove, finlet reaches root of caudal lobe; pectoral long, more or less falcate, reaching origin of soft dorsal; ventrals rather small, extending more than halfway to vent; preanal spines short; anal similar to soft dorsal but much shorter, anterior rays elevated, longest 2.25 in head, finlet opposite dorsal, similar in size; caudal fin deeply forked, lobes equal, tip sharply pointed.

Scales cycloid, deciduous, upper part of head, cheeks, and upper part of operculum scaly; breast with small scales; lateral line nearly straight from gill opening above to fifth ray of soft dorsal below, where it gradually descends to middle of side and goes directly to middle of caudal base; scutes on anterior half of lateral line subequal in size, quadrate and thin, those on tail high and keeled, forming sharply pointed spines.

Color in alcohol bluish gray above, lower parts whitish and silvery; upper, posterior margin of opercle with a deep black blotch; spinous dorsal pale gray; soft dorsal yellowish gray; other fins yellowish.

Total length, 195 millimeters. Described from a specimen obtained at the Taihoku fish market in January, 1918.

Nine specimens from the Taihoku fish market (probably from Keelung); two specimens from Tainan; Bako, Pescadores Islands.

Habitat.—Distributed from the Red Sea to the Malay Archipelago throughout the Indian Ocean.

Decapterus kurroides Bleeker.

Decapterus kurroides BLEEKER, Nat. Tijdschr. Ned. Ind. 8 (1855) 420, seas of Amboina; GÜNTHER, Cat. Fishes 2 (1860) 427, seas of Amboina (after Bleeker).

Head 3.6 in length; depth 4.26; dorsal VIII, 1, 29+I; anal II, 1, 24 + I; pectoral 21; ventral 5; snout 3.19 in head; eye 3.77; interorbital space 3.52; maxillary 2.84; pectoral 1.03; ventral 2.08; scutes 30; scales 55.

Body oblong, slightly compressed, almost perfectly fusiform; head large, conical, its top with a low, median keel reaching to middle of nostrils; mouth rather small, oblique, its angle not reaching a vertical through anterior border of orbit; supplemental bone of maxillary large, elongate, triangular; lower lip much thicker than upper; lower jaw slightly protruding beyond upper, with a small knob above symphysis; vomer, palatines, and tongue with bands of villiform teeth; upper jaw with several series of minute pointed teeth anteriorly, lower jaw with a single series of similar teeth; eye large, slightly anterior and superior; adipose eyelid well developed, covering anterior and posterior parts of pupil; interorbital space broad, strongly convex; nostrils close together, superior, anterior nostril slitlike, posterior oval and larger; gill rakers 5 + 30, flat and horny, elongate, longest 1.69 in eye.

Spinous dorsal continuous, persistent, higher than soft dorsal, longest spine 2.05 in head; origin of soft dorsal just above vent, elongate and low, anterior part elevated, longest ray 2.22 in head, base of fin in a deep groove, finlet triangular, reaching root of caudal lobe; pectorals falcate, elongate, reaching beyond preanal spines above; ventrals rather short, inserted below hind part of pectoral base, reaching more than halfway to vent; preanal spines rather short, folded in a groove; anal similar to soft dorsal but shorter and lower, longest ray 2.69 in head, finlet similar to dorsal one; caudal fin deeply forked, lobes equal, with sharply pointed tip.

Scales cycloid, rather thin, numerous; cheeks, opercles, preopercles, and breast scaly; top of head closely beset with thin, minute scales; lateral line broadly upcurved anteriorly, nearly straight from fourteenth ray of the soft dorsal below to base of caudal, running along middle of tail, scutes rather high, forming sharply pointed spines on lateral line.

Color in alcohol bluish gray above, yellowish silvery below, lower parts whitish; a large, dark brown blotch on upper, posterior part of operculum; spinous dorsal pale bluish gray; other fins dusky.

Total length, 442 millimeters. Described from a specimen obtained at Tôkô in April, 1920.

The present species has not been recorded from localities other than Amboina. Three fine specimens from Tôkô.

Decapterus maruadsi (Temminck and Schlegel).

Caranx maruadsi TEMMINCK and SCHLEGEL, Fauna Japonica, Poiss. (1844) 109, pl. 58, fig. 2, Nagasaki; GÜNTHER, Cat. Fishes 2 (1860) 428, China.

Decapterus maruadsi JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo **33** (1913) 128, Tokyo to Nagasaki.

Japanese name: *Maruaji* or *aoaji;* Formosan name: *Soa-ching-á.*

Head 4.05 in length; depth 4.97; dorsal VIII, 1, 36 + I; anal II, 1, 30 + I; pectoral 21; ventral 5; snout 3.05 in head; eye 3.65; interorbital space 3.75; maxillary 2.95; pectoral 1.53; ventral 2.28; scutes 33; scales 91.

Body oblong, fusiform, slightly compressed, rather low and rounded, dorsal and ventral outlines equally arched; head long, conical, top more or less convex; snout rather long, pointed anteriorly; mouth small, oblique, its angle reaching a vertical through nostrils; upper jaw slightly shorter than lower; lower lip thicker than upper; both jaws with a single series of minute teeth, bands of villiform teeth on vomer, palatines, and tongue; eye anterior and slightly superior; adipose eyelid well developed, covering pupil except middle part; nostrils small, close together, superior; gill rakers 7 + 34, slender and closely set, longest 1.72 in eye.

Spinous dorsal higher than soft dorsal, spines of moderate strength, third the longest, 1.92 in head; soft dorsal elongate, low, anterior rays elevated, longest 2.45 in head, posterior rays folded in a groove; pectorals rather slender, not falcate, scarcely reaching below sixth spine of spinous dorsal; ventrals small, inserted beneath hind edge of pectoral base, not reaching halfway to vent; anal similar to soft dorsal but slightly shorter and lower, anterior rays elevated, longest 2.58 in head; caudal deeply forked, lobes equal, tip sharply pointed.

Scales cycloid and deciduous; cheeks, upper parts of operculum, and breast scaled; scales on occiput much smaller; lateral line broadly upcurved anteriorly, becoming straight below anterior one-third of soft dorsal, running along middle of tail; scutes become higher posteriorly, those on tail with sharply pointed keel directed backward.

Color in alcohol bluish gray above, lower parts whitish and silvery; opercular black spot distinct; spinous dorsal pale gray; other fins yellowish gray, pectoral somewhat paler.

Total length, 225 millimeters. Described from one of seven specimens obtained at the Taihoku fish market in January, 1919.

Habitat.—The waters of Japan (Tokyo to Nagasaki) and China.

Decapterus macrosomus (Bleeker).

Decapterus macrosoma BLEEKER, Nat. Tijdschr. Ned. Ind. **1** (1851) 358, Indian Archipelago; Verh. Bat. Gen. **24** (1852) 87, Sunda-Molucca Islands; Nat. Tijdschr. Ned. Ind. **13** (1857) 372, Sangi Island; Act. Soc. Sci. Indo-Neerl. **8** (1860) 39, Celebes; GÜNTHER, Cat. Fishes **2** (1860) 425, Sea of Batavia (after Bleeker).

Decapterus macrosomus JORDAN and EVERMANN, Proc. U. S. Nat. Mus. **25** (1903) 337, Formosa, Kagoshima; JORDAN and SEALE, Bull. U. S. Fish Comm. **26** (1906) 63, Bulan, P. I.; JORDAN and RICHARDSON Mem. Carnegie Mus. **4** (1909) 178, Formosa; Check-list Philip. Fishes (1910) 19, Philippine Islands.

Branchiostegals 7; dorsal VIII, 1, 33–35 + I; pectoral 2, 20–21; ventral 1, 5; anal II, 1, 27–30 + I; caudal 17. Total length, 150 to 215 millimeters. (*Bleeker.*)

Not obtained.

Body elongate, compressed; depth 6.75 to 7 in total length; width about 1.5 in depth. Head acute, 4.33 to 4.5 in total length, height 1.67 in its length. Predorsal median line sloping downward, nearly straight. Eye 4 in head; snout longer than eye; maxillary not reaching a vertical through anterior margin of orbit; lower jaw slightly longer than upper. Scales on sides minute but conspicuous; lateral line slightly bent, its posterior part armed with 60 scutes. Dorsals separated, spinous dorsal higher than body, second, third, and fourth spines elongate, the longest 3 in total length; pectorals acute, shorter than head; ventrals shorter than half the length of head; caudal lobes acute, 7.3 to 7.33 in total length. Color greenish gray above, silvery below; opercular spot black; all the fins yellowish and hyaline.

Habitat.—Sea of Batavia; Sunda and Molucca Islands, Sangi Island; Celebes; Philippine Islands; Formosa; Japan (Kagoshima).

Remarks.—In 1903, Jordan and Evermann recorded one of the Formosan carangoid fishes, giving it the name *Decapterus macrosomus*. Their fish seems to be different from Bleeker's *D. macrosomus* in having 49 + 38 lateral plates, the latter number being that of the keeled plates on the straight part of the lateral line. The occurrence of the present species in Formosan waters is somewhat doubtful at present.

Genus **MEGALASPIS** Bleeker

Megalaspis BLEEKER, Nat. Tijdschr. Ned. Ind. 2 (1851) 213 (type, *Scomber cordyla* Linnæus).

Body elongate, fusiform, slightly compressed; head conical, pointed anteriorly. Mouth lateral, its angle not reaching a vertical through posterior margin of orbit; lower jaw more or less protruding beyond upper. Teeth villiform in upper jaw, an outer row slightly conical, lower jaw with two or three rows of teeth above symphysis and a single lateral row; vomer, palatines, and tongue with villiform teeth. Maxillary narrow, with a large, triangular supplemental bone. Eye large, adipose eyelid well developed. Dorsal and anal fins each with eight or nine detached finlets, spinous dorsal developed, persistent, lower than the soft dorsal; free anal spines slender. Pectorals long, falcate, reaching far beyond origin of soft dorsal. Scales minute, numerous. Lateral line makes a short and strong curve above root of pectoral, straight part with extraordinarily developed bony plates. Gill rakers horny, long, and flat. Only one species is known from Formosan waters.

Geographical distribution.—East coast of Africa and Red Sea to beyond the Malay Archipelago.

Megalaspis cordyla (Linnæus).

Scomber cordyla LINNÆUS, Syst. Nat. ed. 10 (1758) 298.

Megalaspis cordyla JORDAN and EVERMANN, Proc. U. S. Nat. Mus. 25 (1902) 336, Formosa; FOWLER, Proc. Acad. Nat. Sci. Phila. (1905)

66, Sumatra; Jordan and Seale, Bull. U. S. Bur. Fisheries 25 (1906) 229, Samoa; 26 (1907) 64, Bacon, P. I.; Jordan and Richardson, Bull. U. S. Bur. Fisheries 27 (1908) 250, Manila; Check-list Philip. Fishes (1910) 19, Manila; Mem. Carnegie Mus. 4 (1909) 178, Takao.

Scomber rottleri Bloch, Hist. Nat. Poiss. 10 (1785) 40; Bloch and Schneider, Syst. Ichth. (1801) 25.

Caranx rottleri Rüppell, Atlas Fische (1828) 102, Red Sea; Cuvier and Valenciennes, Hist. Nat. Poiss. 9 (1828) 29; Bleeker, Journ. Ind. Arch. 3 (1849) 67, Celebes; Verh. Bat. Gen. 22 (1849) 3, Bali; 23 (1850) 8, Java; Richardson, Ichth. China (1845) 273, China; Cantor, Cat. Malayan Fishes (1849) 124; Günther, Cat. Fishes 2 (1860) 424, Madras, India, China; Day, Fishes of Malabar (1865) 80, Malabar; Kner, Novara, Fische (1865) 150, Java, Singapore, Hongkong; Klunzinger, Verh. z. b. Ges. Wien (1871) 453; Günther, Fische der Südsee (1873) 130, Indian Ocean and Archipelago; Day, Fishes of India (1876) 213, Red Sea to beyond Malay Archipelago; Fowler, Proc. Acad. Nat. Sci. Phila. (1905) 506, Sumatra.

Megalaspis rottleri Bleeker, Nat. Tijdschr. Ned. Ind. 2 (1851) 213, Celebes; 3 (1852) 57, Singapore; 445, Banka; Verh. Bat. Gen. 24 (1852) 49, Moluccas; 44, Bengal; Verh. Akad. Amsterdam 2 (1855) 10, Diemensland; Act. Soc. Sci. Indo-Neerl. 3 (1858) 2, Borneo; Nat. Tijdschr. Ned. Ind. 16 (1858) 407, Japara; 146, Bali; 19 (1859) 437, Java; Act. Soc. Sci. Indo-Neerl. 8 (1860) 29, Sumatra; 14, Borneo; 39, Celebes; Versl. Akad. Amsterdam 12 (1861) 75, Pinang; 14 (1862) 109, Batan; Ned. Tijdschr. Dierk. 2 (1865) 174, Siam; 191, Ceram; 289, Amboina; Versl. Akad. Amsterdam (2) 2 (1868) 293, Bintang; Ned. Tijdschr. Dierk. 4 (1873) 131, China.

Japanese name: *Oniaji* (Formosa); Formosan name: *Ti-kah.*

Head 3.68 in length; depth 3.68; dorsal VIII-I, 10-IX; anal II-1, 8-VIII; pectoral 21; ventral 5; snout 3.95 in head; eye 4.35; interorbital space 3.6; maxillary 2.75.

Body oblong, fusiform, slightly compressed, dorsal and ventral outlines equally arched, caudal peduncle exceedingly low and depressed; head moderate, conical, dorsal outline convex; mouth rather small, slightly oblique, its angle reaching a vertical through anterior border of pupil; maxillary thin, with a large, triangular supplemental bone; lower jaw protruding beyond upper; vomer, palatines, and tongue with bands of villiform teeth; upper jaw with two series of minute, pointed teeth, banded anteriorly, lower jaw with two or three series of small conical teeth above symphysis and a single lateral row; eye large, anterior and lateral, adipose eyelid well developed, covering pupil anteriorly and posteriorly; interorbital space rather broad, more or less convex, with a low median ridge; nostrils close together, minute, situated midway between tip of snout and orbit; gill openings large, membranes entirely separated; gill rakers flat, horny, longest ones nearly one and a half times as long as pupil, 7 + 21 on first arch.

Spinous dorsal well developed, longest spine 2.6 in head, sixth and seventh spines minute, the latter separated; soft dorsal elevated anteriorly, higher than spinous dorsal, longest ray 2.05 in head, outer margin deeply concave, finlets 9, triangular; caudal fin deeply forked, lobes equal, tip sharply pointed; pectoral falcate, exceedingly long, scarcely reaching first finlet of anal; ventrals inserted below hind part of pectoral base, rather short, not reaching vent; anal similar to soft dorsal but lower and shorter, longest ray 2.19 in head.

Scales numerous, minute; cheeks and upper edge of opercle scaled; an oval scaleless spot before root of ventrals; throat naked; lateral line makes a deep curve above anterior half of pectoral and runs straight along middle of sides, provided with about seventy-eight scales (fifty are large scutes); scutes on lateral line extraordinarily developed, highest one 2.3 in head, strongly keeled on free portion of tail.

Color in alcohol bluish gray above, paler and silvery below; a large black spot on upper and posterior end of operculum; spinous dorsal gray; ventrals white; other fins yellowish gray, outer margin of soft dorsal and anal somewhat darker.

Total length, 363 millimeters. Described from a specimen obtained at Taihoku fish market in December, 1908. Four examples from Tôkô (185 to 222 millimeters in total length); one from Tainan fish market (180 millimeters long).

Habitat.—Common in the southern part of Formosa.

Distributed from the Red Sea to the southern part of Japan through all the Indian seas.

Genus **TRACHURUS** Rafinesque

Trachurus RAFINESQUE, Anim. Piante. Sicilia (1810) 41 (type, *Scomber trachurus* Linnæus = *Trachurus saurus* Rafinesque).

Body slightly compressed, oblong, covered with very small scales; lateral line with a band of high plates from origin to end, each plate with a curved spine. Cleft of mouth moderate, snout rather extended. Two dorsals, the first less developed than the second, with eight spines and with a horizontal anterior spine, directed forward. Two small spines, separated from the soft portion; finlets none. Minute teeth in jaws, on vomer, and on palatines. Seven branchiostegals; pseudobranchiæ present; air bladder bifurcate posteriorly. Pyloric appendages in increased number.

Geographical distribution.—Coasts of Europe and Africa; East Indian and Australian seas; temperate parts of Pacific Ocean.

Trachurus trachurus (Linnæus).

Scomber trachurus LINNÆUS, Syst. Nat. ed. 10 (1758) 298, Mediterranean Sea; BLOCH and SCHNEIDER, Syst. Ichth. (1801) 27.

Trachurus trachurus BLOCH, Naturgesch. Ichth. 2 (1784) 138, pl. 36; GÜNTHER, Cat. Fishes 2 (1860) 419, English coast, Mediterranean, South Europe, Madeira, Cape of Good Hope, Australia, New Zealand; STEINDACHNER, Ichth. Berich. 5 (1868) 32; JORDAN and EVERMANN, Bull. U. S. Nat. Mus. (1896) 910, Newport, Pensacola, Cape San Lucas; JORDAN and SNYDER, Proc. U. S. Nat. Mus. 23 (1901) 748, Yokohama; JORDAN and STARKS, Proc. U. S. Nat. Mus. 28 (1905) 203, Gensan, Korea; SEALE, Philip. Journ. Sci. § D 9 (1914) 62, Hongkong.

Caranx trachurus CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1833) 11; CUVIER, Regne Anim., Poiss. 3 (1836) pl. 57, fig. 1; RICHARDSON, Ichth. China (1845) 273.

Trachurus saurus RAFINESQUE, Indice d'Ittiol. Siciliana (1810) 20, based on *Scomber trachurus* Linn.; JORDAN and GILBERT, Proc. U. S. Nat. Mus. (1883) 191.

Trachurus europaeus GRONOW, Cat. Ed. Gray (1854) 125, seas of Europe.

Selar japonicus BLEEKER, Verh. Bat. Gen. 25 (1853) 35, Japan.

Head 3.8 in length; depth 3.8; dorsal VIII, 1, 31; anal II, 1, 26; pectoral 22; ventral 1, 5; snout 3.39 in head; eye 3.14; interorbital space 3.65; maxillary 2.6; pectoral 1.18; ventral 1.63; scutes 32 + 41.

Body fusiform, rather deeper, slightly compressed, curvature of dorsal and ventral outlines subequal, with a low median keel from origin of spinous dorsal to interorbital space beyond; head large, conical, top convex; snout nearly as long as diameter of eye, obtusely pointed anteriorly; mouth oblique, its angle scarcely reaching a vertical through anterior border of orbit; lower jaw protruding beyond upper, lower lip thicker than upper; supplemental bone of maxillary triangular, upper part slipped beneath lower margin of preorbital; eye large, slightly anterior, adipose eyelids developed, covering posterior part of pupil; both jaws with a single series of minute teeth; bands of villiform teeth on vomer, palatines, and tongue; interorbital space more or less convex, median dorsal line keeled; nostrils close together, superior, nearer to eye than tip of snout; preorbital, suborbital, and postorbital as well as preoperculum with numerous radiated irregular striæ; gill openings large, membranes entirely separated; gill rakers 8 + 35, closely set, slender, longest 1.88 in eye.

Height of spinous dorsal subequal to soft dorsal, spines of moderate strength, when depressed reaching root of soft dorsal, third the longest, 1.69 in head; a recumbent spine directed forward in front of spinous dorsal, entirely hidden beneath the skin; soft dorsal long, low, anterior part elevated, longest ray 1.83 in head, tip of last ray reaching root of caudal lobe; pectoral elongate, more or less falcate, reaching beyond origin of soft dorsal; ventrals inserted beneath hind part of pectoral base, folded in a groove, reaching to vent; anal similar to soft dorsal but a little shorter, anterior rays elevated, the longest 1.9 in head; caudal elongate, deeply forked, tip of each lobe sharply pointed.

Scales minute, deciduous; cheeks, upper part of operculum, and breast scaly; lateral line broadly arched above pectoral, descending at origin of soft dorsal below, running along middle of tail; scutes high, nearly as high anteriorly as posteriorly, those on tail much stronger, with median keel sharply pointed backward, their height about four-fifths of diameter of eye.

Color in alcohol greenish above, paler and silvery below; a black blotch on posterior margin of operculum; spinous dorsal pale gray; rest of the fins yellowish.

Total length, 198 millimeters. Described from a specimen from Tamusui River near Taihoku, collected by Takeo Aoki. Another specimen, 385 millimeters long, was obtained at Taihoku fish market.

Habitat.—The present species is distributed from the coast of temperate parts of Europe, along the coasts of Africa, around the Cape of Good Hope, the East Indian seas, to the coasts of New Zealand and West Australia.

Genus **TRACHUROPS** Gill

Trachurops GILL, Proc. Acad. Nat. Sci. Phila. (1862) 238 (type, *Scomber plumieri* Bloch = *Scomber crumenophthalmus* Bloch).

Body oblong, slightly compressed, dorsal and ventral outlines equally arched; head moderate, more or less compressed. Mouth oblique, its angle not reaching below middle of pupil; supplemental bone of maxillary elongate, triangular; premaxillaries protractile. Both jaws with a single series of minute teeth, those on upper jaw more or less banded anteriorly; bands of villiform teeth on vomer, palatines, and tongue. Shoulder girdle with a deep cross furrow at its junction with isthmus, with a fleshy projection above furrow. Eye large, with well-developed adipose eyelids. Dorsal spines connected, of moderate strength; soft dorsal elongate, anterior rays elevated, both fins depressible in a groove; anal fin similar to soft dorsal but slightly shorter. Caudal deeply forked. Pectorals rather long, falcate. Scales minute, deciduous; lateral line slightly upcurved anteriorly; scutes weak except on caudal peduncle. Only one species is known, from Japanese and Formosan waters.

Geographical distribution.—West Africa; tropical Atlantic; Indian Ocean; Red Sea; Polynesia; Philippines; Formosa; Japan; Hawaiian Islands.

Trachurops crumenophthalmus (Bloch).

Scomber crumenophthalmus Bloch, Ichth. (1793) pl. 343, Acara, in Guinea.

Caranx crumenophthalmus Lacépède, Hist. Nat. Poiss. 4 (1803) 107; Cuvier and Valenciennes, Hist. Nat. Poiss. 9 (1827) 62; Günther, Fische der Südsee 5 (1876) 131, Cape Verde Islands, St. Helena, West Indies, Mexico, Bay of Panama, Hawaiian Islands, South Seas, East Indies, Red Sea; Cat. Fishes 2 (1860) 429, West Africa, Atlantic coast of tropical America, Red Sea, Indian Ocean, Polynesia; Day, Fishes of India (1896) 217, pl. 49, fig. 1, Red Sea, seas of India, Indo-Pacific and tropical Pacific.

Trachurops crumenophthalma Jordan and Evermann, Fishes North & Mid. Am. 1 (1896) 911, pl. 141, fig. 385, Cape San Lucas, Mazatlan, Acapulco, Panama; Snyder, Bull. U. S. Fish Comm. (1902) 523, Hawaiian Islands; Jenkins, Bull. U. S. Fish Comm. (1903) 443, Hawaiian Islands; Jordan and Evermann, Bull. U. S. Fish Comm. (1903) 187, fig. 71, Honolulu; Fowler, Proc. Acad. Nat. Sci. Phila. (1905) 69, West Indies, Panama; Seale, Occ. Papers Bishop Mus. 4 (1906) 30, Polynesian Islands; Jordan and Seale, Bull. U. S. Bur. Fisheries 26 (1906) 230, Samoa, Hawaii, Tahiti, Solomon Islands, New Hebrides; 13, Cavite, P. I.; Jordan and Richardson, Bull. U. S. Fish Comm. 27 (1908) 250, Philippines; Mem. Carnegie Mus. 4 (1909) 178, Formosa; Check-list Philip. Fishes (1910) 20, Manila, Lubang; Snyder, Proc. U. S. Nat. Mus. 42 (1911) 496, Riu Kiu.

Scomber balantiophthalmus Bloch and Schneider, Syst. Ichth. (1801) 29, Guinea.

Scomber plumieri Bloch, Ichth. 10 (1797) 67, pl. 344, Antilles.

Caranx daubentoni Lacépède, Hist. Nat. Poiss. 3 (1801) 58.

Caranx mauritianus Quoy and Gaimard, Voy. Uranie, Zool. (1824) 359, Mauritius.

Caranx macrophthalmus Rüppell, Atlas Reis. Nörd. Af. (1828) 97, pl. 25, fig. 4, Red Sea.

Caranx (*Selar*) *macrophthalmus* KLUNZINGER, Fische des Rothen Meeres (1884) 97, Red Sea.

Caranx torvus JENYNS, Zool. Voy. Beagle (1841) 69, pl. 15, Tahiti.

Trachurops torva JORDAN and EVERMANN, Proc. U. S. Nat. Mus. 25 (1903) 337, Giran, Formosa; SENO, Report Form. Fish. (1910) 118, Bako, Pescadores Islands.

Japanese name: *Meaji.*

Head 3.3 in length; depth 3.52; dorsal VIII, 1, 26; anal II, 1, 22; pectoral 20; ventral 1.5; snout 3.25; eye 3.05; interorbital space 3.75; maxillary 4.09; pectoral 1.18; ventral 2.13; scutes 35.

Body oblong, elongate, rather deep, slightly compressed, dorsal and ventral outlines equally arched; head moderate, conical, but compressed; mouth oblique, its angle reaching a vertical through anterior margin of orbit; lower jaw projecting beyond upper; supplemental bone of maxillary elongate, triangular; upper jaw with a narrow band of villiform teeth anteriorly, lower jaw with a single series of minute teeth; vomer, palatines, and tongue with bands of villiform teeth; eye very large, a little longer than snout and greater than interorbital space; adipose eyelid strongly developed, covering anterior and posterior parts of pupil; nostrils close together, superior, posterior nostril slitlike; shoulder girdle near isthmus with a fleshy projection, in front of which is a deep cross furrow; gill openings large, membranes entirely separated; hind margin of operculum with a low triangular projection above pectoral base; gill rakers 10 + 29, slender, the longest 2.14 in eye.

Spinous dorsal slightly higher than the soft dorsal, spines of moderate strength, third the longest, 2 in head; origin of soft dorsal nearer to base of caudal than tip of snout, fin low and elongate, anterior rays elevated, the longest 2.22 in head, posterior rays folded in a groove; pectoral moderately long and falcate, reaching beneath third ray of soft dorsal; ventrals rather small, in a shallow groove, scarcely reaching vent; anal similar to soft dorsal but slightly shorter, anterior rays elevated, the longest 2.45 in head; caudal rather small, deeply forked, tip of each lobe sharply pointed.

Scales small, deciduous, those on breast and occiput much smaller; cheeks and upper part of operculum scaly; lateral line slightly upcurved above pectoral, running along middle of tail; scutes little developed except on caudal peduncle, those on tail rather high and provided with a sharply pointed keel.

Color in alcohol bluish silvery above, paler below, with brassy reflection, underparts whitish; opercular spot rather small, more or less indistinct, black.

Total length, 193 millimeters. Described from one of nine specimens obtained from the Taihoku fish market in December, 1918.

Habitat.—Takao; Giran; Bako, Pescadores Islands. An abundant and well-known species in the Red Sea, the seas of India, Indo-Pacific and tropical Atlantic, Hawaiian Islands, and in Japan.

Genus **CARANX** (Lacépède) Bleeker

Caranx LACÉPÈDE, Hist. Nat. Poiss. **3** (1802) 57 (type, *Scomber speciosus* Forskål) (part).

Caranx BLEEKER, Nat. Tijdschr. Ned. Ind. **8** (1855) 417 (type, *Scomber carangus* Bloch = *Scomber hippos* Linnæus) (restricted).

Carangus GRIFFITH, Class Pisces (1834) 335 (type, *Scomber carangus* Bloch).

Body ovate or oblong, compressed, the back sometimes considerably elevated, sometimes a little arched; head moderate or rather large, more or less compressed. Mouth moderate or large, oblique; maxillary broad, with a well-developed supplemental bone extending to below eye; premaxillaries protractile. Teeth on upper jaw in several series, outer ones larger, lower jaw with a single series of small pointed teeth, anterior two or four caninelike; vomer, palatines, and tongue with bands of villiform teeth. Gill rakers long. Eye large, with adipose eyelids. Dorsal spines rather low, connected; soft dorsal long, usually elevated in front, both fins depressible in a groove. Anal fin similar to soft dorsal and nearly as long, preceded by two rather strong spines, its base longer than abdomen. Caudal fin strongly forked, the peduncle very slender. Ventral fins moderate; pectorals falcate, no finlets. Preopercle entire in the adult, serrate in the young, usually with a membranous border. The species are very numerous in all warm seas; most of them are valued for food.

Geographical distribution.—All the temperate and tropical seas.

Key to species of Caranx (Lacépède) Bleeker.

a^1. Breast entirely naked.
  b^1. Dorsal VII, 1, 23; anal II, 1, 18; pores in lateral line about 127. **C. formosanus.**
  b^2. Dorsal VIII, 1, 22; anal II, 1, 18; scales 90; scutes 33 to 36.... **C. jarra.**

*a*². Breast naked except a small oval patch before ventrals; dorsal VIII, 1, 19–22; anal II, 1, 16–18; scutes 30 to 33 .... **C. hippos.**

*a*³. Breast scaly; anal II, 1, 17.

*b*¹. Body oblong, elongate; dorsal VIII, 1, 21; scutes 34 to 38.. **C. cynodon.**

*b*². Body ovate, rather deep; dorsal VIII, 1, 19–22; scutes 30 to 36. **C. forsteri.**

Caranx jarra Cuvier and Valenciennes.

Caranx jarra CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1833) 109; BLEEKER, Verh. Bat. Gen. 24 (1852) 58, Sunda-Molucca Islands; 25 (1853) 44, Bengal, Hindostan; Act. Soc. Sci. Indo-Neerl. 8 (1860) 29, Sumatra; GÜNTHER, Cat. Fishes 2 (1860) 446, Amboina; DAY, Fishes of India (1876) 215, seas of India to Malay Archipelago; JORDAN and EVERMANN, Proc. U. S. Nat. Mus. 25 (1903) 337, Keelung; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 178, Keelung; SNYDER, Proc. U. S. Nat. Mus. 42 (1911) 496, Riu Kiu.

Carangas jarra BLEEKER, Ned. Tijdschr. Dierk. 2 (1865) 290, Amboina.

Head 4.33 in total length; depth 3.67; dorsal VIII, 1, 22; anal II, 1, 18; pectoral 21; ventral 1, 5; eye 4.67 in head; pectoral 3 in total length; scutes 33 to 36.

Dorsal outline of body a little more convex than ventral outline; eyes with broad posterior adipose eyelids extending two-thirds across iris; snout longer than diameter of eye; interorbital space one and a half times as broad as eye; jaws subequal; maxilla reaches to below middle of orbit; greatest height of preorbital equals one diameter of eye; teeth villiform in premaxillaries, with an external conically enlarged row; villiform in lower jaw, on vomer, palatines, and tongue.

Dorsal spines increase to the third, which is 2.65 in depth; first few rays of soft dorsal elevated, the highest 1.66 in depth; pectoral falcate, 3.33 in total length; anal similar to soft dorsal, its first few rays 2 in depth.

Scales cover cheeks, upper portion of opercles, and behind eyes, but none exist along median longitudinal crest on head, which is well developed, breast naked; soft dorsal and anal bases in a distinct scaly sheath; lateral line forms a low, undulating arch in its first half, which terminates below seventh dorsal ray; height of arch 4.5 in length of its base; scales 90 in lateral line, scutes begin at commencement of straight portion, becoming largest below end of soft dorsal, where they are one-ninth of depth of body.

Color greenish above, becoming dull white on sides and below. No opercular spot. (*Day.*)

Not seen by me.

Habitat.—Keelung (*Jordan and Evermann*); seas of India to the Malay Archipelago. Specimens of this species attain at least a foot in length.

Remarks.—Günther's *Caranx jarra* from Amboina is provided with a single series of teeth in lower jaw.

Caranx formosanus Jordan and Snyder.

Carangus armatus JORDAN and EVERMANN, Proc. U. S. Nat. Mus. 25 (1903) 338, Formosa (part) (not of Forskål).

Caranx formosanus JORDAN and SNYDER, Mem. Carnegie Mus. 4 (1909) 38, Takao, Formosa; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 178, Takao, Formosa.

Head 3.2 in length to base of caudal; depth 2; depth of caudal peduncle 6 in head; eye 4.5; snout 2.5; width of interorbital space 3.33; dorsal VII, 23; anal II, 19; pores in lateral line about 127.

Dorsal contour of body almost evenly rounded from tip of snout to insertion of dorsal, there being but a slight elevation at occiput, and a small depression anterior to nostrils; interorbital area slightly higher than diameter of eye, the crest sharp. Jaws equal; maxillary extending to a vertical through anterior edge of orbit, the width of its posterior edge contained 1.25 times in suborbital. Broad bands of fine teeth on jaws, vomer, and palatines. Gill rakers short and strong, 4 + 16 on first arch, those on anterior part of lower limb very short, the longest (near angle of arch) contained 7.5 times in head.

Scales very small; base and axil of pectoral, breast, and throat naked; a small isolated patch of minute, partly embedded scales anterior to base of pectoral; cheek and upper part of preopercle and opercle with small scales; head otherwise naked, the unscaled area extending backward to base of spinous dorsal. Lateral line broadly curved above pectoral, the curved part including considerably more than half of the lateral line; straight part of lateral line with small, weak plates, those on caudal peduncle scarcely keeled and without spines.

Dorsal with 7 spines, the posterior 2 small and detached, the highest spine 2.33 in head. Anterior part of soft dorsal elevated but not filamentous, the height 2 in head; other rays 4.5 in head. Caudal lobes equal, 3.1 in length. Pectoral falcate, 2.87 in length. Ventrals 2.5 in length.

Color silvery; a small dusky spot at upper edge of opercle; axil black; dorsals, anal, and caudal edged with dusky; ventral and pectoral immaculate.

Described from the type, an example 11.5 inches long from Takao, Formosa. (*Jordan and Snyder.*)

Not seen by me.

Habitat.—Takao, Formosa.

Remarks.—The gill rakers, few in number and very short, especially on anterior part of lower limb, are characteristic of the species (*Jordan and Snyder*).

Caranx hippos (Linnæus).

Scomber hippos LINNÆUS, Syst. Nat. ed. 12 (1766) 494, Charleston, South Carolina, U. S.

Scomber carangus BLOCH, Ichthyol. (1793) pl. 340, Antilles.

Caranx carangus LACÉPÈDE, Hist. Nat. Poiss. 3 (1802) 59, 74, Martinique; CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1833) 91; GÜNTHER, Cat. Fishes 2 (1860) 448, Santo Domingo, West Indies, India, Madras, Amboina, Sumatra; DAY, Fishes of India (1876) 215, pl. 50, fig. 4, seas of India, Malay Archipelago; KNER, Novara, Fische (1865) 157.

Carangus carangus BLEEKER, Ned. Tijdschr. Dierk. 4 (1873) 131, China; Rech. Fauna Madagascar (1875) 99, Madagascar; Verh. Akad. Amsterdam 18 (1879) 18, Maurice Island; 14, Japan.

Caranx hippos KLUNZINGER, Verh. z. b. Ges. Wien (1871) 463, Red Sea; JORDAN and EVERMANN, Bull. U. S. Nat. Mus. (1896) 920, tropical America, north to Cape Cod and Gulf of California.

Caranx lessonii BLEEKER, Nat. Geneesk. Arch. Ned. Ind. 2 (1845) 517, Batavia (not of Cuvier and Valenciennes); Verh. Bat. Gen. 23 (1850) 8, Java; 25 (1853) 44, Bengal; Verh. Akad. Amsterdam 2 (1855) 10, Diemensland; Versl. Akad. Amsterdam (2) 2 (1868) 282, New Guinea.

Head 3.4 in length; depth 2.35; dorsal VIII, 1, 19; anal II, 1, 16; pectoral 19; ventral 1, 5; snout 3 in head; eye 3.65; interorbital space 3.65; maxillary 2.3; ventral 1.96; pectoral 3.1 in length; scales about 60; scutes 30.

Body oblong, compressed, dorsal outline rather more convex than ventral, steeper anteriorly, straight from nape to tip of snout, ventral outline weakly convex from origin of anal to tip of snout, obliquely ascending from former to caudal peduncle; head nearly as long as high, subconic, greatly compressed; occipital crest rather low; snout short and high, obtusely pointed anteriorly; mouth slightly oblique, low, its angle reaching a vertical through anterior margin of pupil; lower jaw somewhat longer than upper; lips subequal in thickness; upper jaw with several series of pointed teeth, banded anteriorly, those of outer series much stronger, lower jaw with a single series of minute pointed teeth, one pair of caninelike teeth near symphysis; vomer, palatines, and tongue with bands of villiform teeth; eye moderate, anterior and superior; adipose eyelid slightly developed, covering posterior part of eye; supplemental bone of maxillary elongate, upper edge slipping beneath preorbital; nostrils close together, in front of eye, much nearer to eye than tip of snout; gill openings lateral, rather large, membranes entirely separated; gill rakers 3 + 12, flat and widely set, the longest one 2 in eye.

Spinous dorsal lower than soft dorsal, spines slender and of moderate strength, the longest 2.3 in head; a recumbent spine in front of origin of spinous dorsal; soft dorsal elongate, rather low, anterior rays elevated, the longest 1.5 in head, anterior part of base in a low scaly sheath; pectoral elongate, falcate, reaching beyond origin of anal; ventrals small, inserted below hind part of pectoral base, scarcely reaching vent; anal similar to soft dorsal but slightly shorter, anterior rays elevated, longest 1.7 in head; caudal deeply forked, lobes equal, with sharply pointed tip.

Scales small, cycloid, becoming smaller anteriorly; cheeks densely scaled; postorbital part and upper part of operculum scaly; breast naked except a small patch in front of ventrals, scales on the patch very small; occipital naked portion extends backward to the recumbent spine; lateral line strongly arched above pectoral, abruptly becoming straight below fifth dorsal ray; scutes commence at beginning of straight portion, enlarging posteriorly, each with a sharply pointed keel.

Color in alcohol grayish silvery above, underparts of side silvery and whitish; opercular spot distinct; spinous dorsal pale gray; other fins yellowish; soft dorsal margined with black; outer margin of caudal somewhat darker.

Total length, 214 millimeters. Described from one of three specimens purchased at the Tainan fish market (probably from Anpin) in April, 1910.

Habitat.—Distributed from the west coast of Africa to the Atlantic coast of tropical America, and the Indian Ocean and Archipelago.

Caranx cynodon Bleeker.

Caranx cynodon BLEEKER, Nat. Tijdschr. Ned. Ind. 1 (1851) 362, Indian Archipelago; Verh. Bat. Gen. 24 (1852) 57, Sunda-Molucca Islands; Nat. Tijdschr. Ned. Ind. 12 (1856) 214, Banka; Act. Soc. Sci. Indo-Neerl. 8 (1860) 29, Sumatra; GÜNTHER, Cat. Fishes 2 (1860) 447, Sea of Batavia; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 26 (1907) 64, Philippines; JORDAN and RICHARDSON, Check-list Philip. Fishes (1910) 20, ? Bacon, Philippines.

Head 3.42 in length; depth 3.5; dorsal VIII, 1, 21; anal II, 1, 17; pectoral 19; ventral 1.5; snout 4.37 in head; eye 5; interorbital space 3.9; maxillary 2.4; ventral 2.55; pectoral 2.8 in length; scales about 65; scutes 38.

Body oblong, more or less fusiform, not compressed, dorsal outline more strongly arched than ventral, steeper anteriorly, nearly straight from interorbital space to tip of snout, nearly straight from tip of throat to origin of anal, obliquely ascending posteriorly to caudal peduncle; head large, conical, much longer than deep, top broadly convex, median dorsal crest indistinct; snout rather short and high, obtusely pointed anteriorly, suborbital region nearly as deep as diameter of eye; mouth large, low, and slightly oblique, its angle reaching a vertical through center of pupil; supplemental bone of maxillary rather short, triangular; lips subequal in thickness; upper jaw slightly shorter than lower, with two or three series of small, pointed teeth, those of outer row larger; lower jaw with a single series of pointed teeth, four caninelike teeth of larger size near symphysis; vomer, palatines, and tongue with bands of villiform teeth; eye moderate, superior, and strongly anterior; adipose eyelids exceedingly developed, especially at postorbital portion, entirely covering posterior half of pupil; nostrils slitlike, close together, in front of eye; gill opening large; gill rakers 3 + 14, flat and horny, the longest 1.4 in eye.

Spinous dorsal slightly lower than soft dorsal, spines rather strong, third the longest, 2.85 in head; soft dorsal low and elongate, anterior rays elevated, longest 2.2 in head, anterior half of base of fin in a low scaly sheath; pectorals elongate, falcate, tip reaching beyond origin of anal; ventrals short, inserted beneath hind part of pectoral base, not reaching vent; anal similar to soft dorsal but slightly shorter, inserted below eighth dorsal ray, longest ray 2.2 in head, caudal deeply forked, lobes subequal with sharply pointed tip.

Scales minute, not deciduous; cheeks, upper part of operculum, and breast scaled; naked part on occiput extending backward to origin of spinous dorsal; lateral line strongly upcurved above pectoral, becoming straight below third dorsal ray; scutes along the whole length of straight portion, becoming strongest on caudal peduncle, keel rather weak, slightly pointed posteriorly.

Color in alcohol uniformly gray above, paler below; opercular spot distinct; dorsals and caudal dusky, the latter margined with black; other fins paler.

Total length, 550 millimeters. Described from a specimen from the Taihoku fish market.

Habitat.—A single specimen (locality unknown). The present species is recorded from the Sea of Batavia and from the Philippine Islands.

Caranx forsteri Cuvier and Valenciennes.

Caranx forsteri CUVIER and VALENCIENNES, Hist. Nat. Poiss. **9** (1833) 107, Isle of France, Malabar, Celebes, New Guinea, New Ireland, Vanicoro, East Indies; KNER, Novara, Fische (1865) 158, Java, Madras; JORDAN and EVERMANN, Bull. U. Š. Fish Comm. **23** (1903) 191, Hawaiian Islands; JORDAN and SEALE, Proc. U. S. Nat. Mus. **28** (1905) 775, Philippine Islands; SEALE, Occ. Papers Bishop Mus. **4** (1906) 30, South Pacific; JORDAN and SEALE, Bull. U. S. Bur. Fisheries **26** (1906) 230, Samoa; 13, Cavite, P. I.; JORDAN and RICHARDSON, Bull. U. S. Bur. Fisheries **27** (1908) 250, Philippines; Mem. Carnegie Mus. **4** (1909) 178, Keelung; SNYDER, Proc. U. S. Nat. Mus. **42** (1911) 496, Riu Kiu.

Caranx hippos GÜNTHER, Cat. Fishes **2** (1860) 449, St. Vincent, Jamaica, Puerto Cabello, South America, West Indies, Madagascar, Port Natal, China, Ceylon, Pinang Sea (not of Linnæus); DAY, Fishes of Malabar (1865) 86, Malabar; Fishes of India (1876) 216, seas of India to beyond the Malay Archipelago, China.

Caranx sexfasciatus JORDAN and EVERMANN, Proc. U. S. Nat. Mus. **25** (1903) 337, Keelung, Formosa (not of Quoy and Gaimard).

Head 3.47 in length; depth 2.67; dorsal VIII, 1, 20; anal II, 1, 17; pectoral 20; ventral 1, 5; snout 3.35 in head; eye 3.6; interorbital space 3.35; maxillary 2.14; ventral 2.14; pectoral 3.15 in length; scales about 48; scutes 31.

Body oblong, slightly compressed, curvature of dorsal and ventral outlines subequal, forming a gradual slope, a low median dorsal crest from origin of spinous dorsal to interorbital space; head subconic, slightly longer than deep, top strongly convex; snout rather short, bluntly pointed anteriorly; mouth oblique, its angle scarcely reaching a vertical through center of pupil; lower jaw very slightly longer than upper; supplemental bone of maxillary rather large, elongate and triangular, its upper edge slipping below preorbital; upper jaw with several series of minute pointed teeth, banded anteriorly, those on outer series much larger, lower jaw with a single series of minute teeth, one pair of caninelike teeth near symphysis; bands of villiform teeth on vomer, palatines, and tongue; eye small, anterior and superior, adipose eyelids in front and behind pupil; nostrils large, close together, approximating eye; gill openings large, lateral, membranes entirely separated; gill rakers 6 + 16, flat and pointed, the longest 1.86 in eye.

Spinous dorsal small, much lower than soft dorsal, spines of moderate strength, third the longest, 2.45 in head; origin of soft dorsal midway between tip of snout and fork of caudal, just over root of second anal spine, anterior rays rather strongly elevated, longest 1.74 in head; pectorals elongate, falcate, scarcely reaching origin of anal; ventrals short, inserted below middle of pectoral base, reaching vent; anal similar to soft dorsal, inserted below fifth dorsal ray, anterior rays elevated, longest 1.74 in head; caudal deeply forked, lobes subequal; a recumbent spine before spinous dorsal concealed beneath skin.

Scales minute; cheeks, upper part of operculum, and breast scaled; naked part on occiput extends backward to the recumbent spine; lateral line strongly convex above pectoral, becoming straight below third dorsal ray, keeled scutes extend the whole distance along straight portion, becoming much larger posteriorly.

Color in alcohol golden, having a tinge of bluish gray above, underparts whitish and silvery; opercular spot none; spinous dorsal gray; other fins yellow; outer margin of soft dorsal black anteriorly; caudal margined with black.

Total length, 195 millimeters. Described from a specimen purchased at the Taihoku fish market in November, 1912.

Habitat.—Keelung; Tôkô; Tainan; Giran.

Seas of India to the Malay Archipelago; Philippine Islands; South Pacific; China; Riu Kiu; Hawaiian Islands.

Genus SELAR Bleeker

Selar BLEEKER, Nat. Tijdschr. Ned. Ind. 1 (1851) 359 (type, *Caranx hasselti* BLEEKER).

Body ovoid, more or less fusiform, compressed. Head rather small, conic; snout pointed anteriorly. Mouth oblique; supplemental bone of maxillary triangular, reaching below middle of orbit; both jaws with a single series of pointed teeth; vomer, palatines, and tongue with bands of villiform teeth. Soft dorsal and anal elongate and low, anterior rays slightly elevated but not falcate. Lateral line strongly arched above pectoral, straight portion much longer than the chord of the former, provided with well-developed keeled scutes. Finlets none.

Geographical distribution.—Malay Archipelago; Hawaiian Islands.

Key to species of Selar Bleeker.

a^1. Dorsal with 23 to 26 rays; anal with 20 to 22 rays.
  b^1. Head rather short, more than 4 in length; depth less than 3; dorsal spines 8........ **S. djeddaba.**
  b^2. Head moderate, less than 4 in length; depth more than 3; dorsal spines 7........ **S. affinis.**
a^2. Dorsal with 20 or 21 rays; anal with 16 rays.
  b^1. Scutes in the straight portion of lateral line more than 30. **S. sexfasciatus.**
  b^2. Scutes in the straight portion of lateral line less than 30.. **S. ignobilis.**

Selar djeddaba (Forskål).

Scomber djeddaba FORSKÅL, Descr. Anim. (1775) 56.

Caranx djeddaba RÜPPELL, Atlas Fische (1828) 97, pl. 25, fig. 3, Red Sea; CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1838) 51; DAY, Fishes of India (1876) 218, Red Sea, east coast of Africa, Seas of India to beyond the Malay Archipelago; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 26 1907) 65, Philippines; JORDAN and RICHARDSON, Bull. U. S. Bur. Fisheries 27 (1908) 250, Manila; Mem. Carnegie Mus. 4 (1909) 178, Takao, Formosa; Check-list Philip. Fishes (1910) 20, Philippines; SEALE, Philip. Journ. Sci. § D 9 (1914) 62, Hongkong.

Head 4.25 in length; depth 2.9; dorsal VIII, 1, 23; anal II, 1, 20; pectoral 21; ventral 1,5; snout 3.4 in head; eye 4; interorbital space 3.1; maxillary 2.65; pectoral 4.23 in length, 1.92 in head; scales 38; scutes 45.

Body ovate, compressed, deepest in front of origin of soft dorsal, dorsal and ventral outlines equally arched; head rather small, slightly compressed, pointed, top with a well-developed median crest, running from origin of spinous dorsal to interorbital space; mouth rather small, oblique, its angle scarcely reaching a vertical through anterior border of orbit; supplemental bone of maxillary large, elongate, triangular; lower jaw a little longer than upper; both jaws with a single series of pointed subequal teeth; a triangular patch of villiform teeth on vomer, a narrow band of same on palatines, median part of tongue with a band of villiform teeth; eye moderate, a little anterior and superior, adipose eyelids well developed, covering posterior part of pupil; nostrils small, close together, in front of eye above; gill openings moderate, membranes entirely separated; gill rakers 7 + 29, flat, slender, long, the longest 1.75 in eye.

Spinous dorsal as high as soft dorsal, spines of moderate strength, folded in a groove, third and fourth spines subequal in length, 2 in head; soft dorsal low and elongate, anterior rays elevated, the longest 2 in head, anterior half of base of fin in a scaly sheath, last ray finletlike, reaching root of caudal lobe; pectorals elongate, falcate, reaching beyond origin of anal; ventrals short, extending beyond vent; anal similar to soft dorsal but slightly shorter, anterior rays elevated, the longest 2 in head, anterior two-thirds of base of fin in a scaly sheath, the last ray finletlike; caudal deeply forked, upper lobe slightly longer than lower, tip of each lobe sharply pointed.

Scales small, not deciduous; cheeks, upper hind part of eye, upper part of operculum, and breast scaled, scales on breast and upper part of pectoral base much smaller; lateral line strongly upcurved above pectoral, becoming straight below origin of soft dorsal, running along middle of tail; scutes commence on first scale of straight portion, becoming higher posteriorly, each scute with a median keel pointed backward.

Color in alcohol bluish silvery above, becoming golden below; an opercular spot of bluish black color; spinous dorsal gray; soft dorsal gray, anterior part yellowish; rest of fins yellow, upper lobe of caudal darker; anterior part of anal with brownish gray tinge near base; operculum golden; cheeks silvery.

Total length, 280 millimeters. Described from a specimen from the Taihoku fish market, obtained in December, 1918.

Habitat.—Red Sea; east coast of Africa; seas of India; Malay Archipelago; Philippine Islands and beyond.

My specimens were purchased at Tainan and Taihoku fish markets, two from the former and six from the latter.

Remarks.—The present species differs slightly from the descriptions of Day and of Rüppell in having a shorter maxillary which does not reach to below first third of eye; but there is no doubt regarding the identity, because it is essentially identical with the figures of both authors.

Günther's *Caranx djeddaba*[6] from Pinang Sea seems to be different from the present species in having a large number of scutes (55 to 58).

Selar affinis (Rüppell).

> *Caranx affinis* RÜPPELL, Neue Wirbelthiere, Fische (1835) 49, pl. 14, fig. 1, Red Sea; DAY, Fishes of India (1876) 219, pl. 49, fig. 4, Red Sea, seas of India, Andamans, to the Malay Archipelago; JORDAN and SEALE, Bull. U. S. Bur. Fisheries **26** (1906) 232, Hawaii; Bull. U. S. Fish Comm. **26** (1907) 64, Philippines; JORDAN and RICHARDSON, Bull. U. S. Bur. Fisheries **27** (1908) 250, Cavite, P. I.; Mem. Carnegie Mus. **4** (1909) 178, Takao, Formosa.

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[6] Cat. Fishes 2 (1860) 432.

Caranx (*Selar*) *affinis* KLUNZINGER, Fische des Rothen Meeres (1879) 19, Red Sea; STEINDACHNER, Denks. Ak. Wiss. Wien **70** (1900) 495, Honolulu.

Carangus affinis JENKINS, Bull. U. S. Fish Comm. **22** (1903) 446, Honolulu; SNYDER, Bull. U. S. Fish Comm. **22** (1903) 523, Honolulu; JORDAN and EVERMANN, Bull. U. S. Fish Comm. **23** (1903) 195, Honolulu.

Caranx hasseltii GÜNTHER, Cat. Fishes **2** (1860) 430, Amboina, Moluccas, Sunda.

Selar hasseltii BLEEKER, Nat. Tijdschr. Ned. Ind. **1** (1851) 359, Indian Archipelago; **2** (1851) 213, Celebes; Verh. Bat. Gen. **24** (1852) 54, Sunda-Molucca Islands; **25** (1853) 44, Bengal; Nat. Tijdschr. Ned. Ind. **17** (1858) 146, Bali; **18** (1859) 366, Banka; Act. Soc. Sci. Indo-Neerl. **8** (1860) 29, Sumatra; 39, Celebes; Versl. Akad. Amsterdam **12** (1861) 75, Pinang; **14** (1862) 109, Batjan; Ned. Tijdschr. Dierk. **1** (1863) 156, Halmahera.

Head 3.9 in length; depth 3.5; dorsal VII, 1, 23; anal II, 1, 20; snout 3.6 in head; eye 4.1; interorbital space 3.6; maxillary 3; scutes 43.

Body fusiform, dorsal and ventral outlines about the same; head longer than deep; snout conic, its tip on a line with middle of eye; upper jaw bluntly rounded; lower jaw produced, rather pointed; series of small teeth on vomer, palatines, and tongue, a single series of minute caninelike teeth in each jaw; tongue rounded, thin, and moderately wide, free for most of its length; maxillary reaching anterior edge of orbit; dorsal spines weak and thin, the longest 2.1 in head; soft dorsal sheathed, its longest ray 2.2 in head, its origin midway between tip of snout and last scute and directly over second anal spine; caudal forked; anal similar to soft dorsal, its longest ray 2.3 in head, spines very short, less than eye; ventrals short, just reaching posterior edge of vent, 2.1 in head; pectoral long, narrow, falcate, nearly reaching straight part of lateral line, its length 1.2 times the length of head; lateral line with a long curve, whose chord nearly equals the straight part, lateral line becoming straight under about tenth soft dorsal ray; scutes on entire straight part of lateral line; in some examples a trace of a second lateral line under soft dorsal fin, continuing to posterior edge of dorsal spine.

Color in alcohol bluish silvery above, becoming white silvery below lateral line; dorsal and caudal dusky, other fins pale, axil of pectoral black, a black spot on upper posterior edge of opercle, covering upper end of shoulder girdle, slightly larger than pupil. (*Jordan and Evermann.*)

Not obtained by me.

Habitat.—Distributed from the Red Sea, seas of the Indian and the Malay Archipelagoes, Philippine Islands, and to the Hawaiian Islands.

A single specimen from Takao (*Jordan and Richardson*).

Selar sexfasciatus (Quoy and Gaimard).

? Caranx sexfasciatus QUOY and GAIMARD, Zool. Voy. Uranie (1824) 358, pl. 65, fig. 4, Papous Islands.

Carangus rhabdotus JENKINS, Bull. U. S. Fish Comm. 22 (1902) 444, Honolulu; JORDAN and EVERMANN, Bull. U. S. Fish Comm. 23 (1903) 193, Honolulu.

Caranx sexfasciatus JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 178, Takao, Formosa (not of Jordan and Evermann).

Head 3.4 in length; depth 2.6; dorsal VIII, 1, 20; anal II, 1, 16; eye 3.75 in head; snout 3.8; maxillary 2.1; interorbital space 3.3; scutes 32.

Body oblong, elliptical, compressed; dorsal outline evenly arched, ventral outline slightly straighter than dorsal outline; head compressed, its depth equal to length; snout bluntly rounded, lower jaw slightly produced; mouth moderate, slightly oblique; villiform teeth on vomer, palatines, and tongue, and a single row of small conical teeth on each jaw; maxillary reaching to posterior edge of pupil, its greatest width about 0.75 in eye; center of eye slightly above axis of body, anterior; interorbital space convex; fins moderate; longest dorsal spine 2.5 in head, soft dorsal slightly concave, longest ray 1.75 in head; caudal forked, lobes moderate; anal similar to soft dorsal; ventrals short, 2.2 in head; pectoral long, falcate, reaching slightly beyond arch of lateral line, equal to head; body completely scaled; bases of soft dorsal and anal with a low sheath of scales; cheek and upper part of opercle scaled, rest of head naked; breast scaled; lateral line strongly arched above pectoral, the arch joining straight portion under fifth dorsal ray, chord of arch equaling length of head or 1.5 in straight portion; scutes rather strong, the largest 0.65 diameter of eye in width.

Color in alcohol bright silvery, darker above, with five indistinct vertical bands nearly as wide as eye on upper three-fourths of body, a sixth band less distinct on caudal peduncle; no opercular spot; fins plain, except the elevated portions of soft dorsal and anal, which are tipped with black. (*Jordan and Evermann.*)

Not obtained by me.

Habitat.—Takao (*Jordan and Richardson*); Papous Islands; Hawaiian Islands; Philippines.

Remarks.—The present description is a copy of that of *Carangus rhabdotus* from Honolulu, recorded by Jordan and Evermann, which is identical with *Caranx sexfasciatus* Quoy and Gaimard.

Selar ignobilis (Forskål).

Scomber ignobilis FORSKÅL, Descript. Anim. (1775) 55, Red Sea.

Scomber sansun FORSKÅL, Descript. Anim. (1775) 56, Red Sea.

Caranx sansun RÜPPELL, Atlas Reis. Nördl. Af. (1828) 101, Red Sea; GÜNTHER, Cat. Fishes 2 (1860) 447, Mauritius, India; KLUNZINGER, Verh. z. b. Ges. Wien (1871) 446, Red Sea; DAY, Fishes of India (1876) 216, pl. 50, fig. 5, Madras.

Caranx sem CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1833) 105, Pondicherry.

Caranx lessonii CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1833) 113, New Holland.

Caranx ignobilis KLUNZINGER, Sitz. Ak. Wiss. Wien 80 Abt. 1 (1879) 377, Port Darwin and Cleveland Bay, Australia; Fische des Rothen Meeres (1884) 100, Red Sea; STEINDACHNER, Denks. Ak. Wiss. Wien 70 (1900) 495, Honolulu; JORDAN and EVERMANN, Bull. U. S. Fish Comm. 23 (1903) 188, Honolulu; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 26 (1906) 231, Samoa; (1907) 14, Philippines; JORDAN and STARKS, Proc. U. S. Nat. Mus. 32 (1907) 494, Riu Kiu; JORDAN and RICHARDSON, Bull. U. S. Bur. Fisheries 27 (1908) 250, Philippines; Carnegie Mus. 4 (1909) 178, Takao, Formosa; Check-list Philip. Fishes (1910) 20, Philippines; SNYDER, Proc. U. S. Nat. Mus. 42 (1912) 411, Kagoshima; 497, Okinawa.

Head 3.5 in length; depth 3; dorsal VIII, 1, 21; anal II, 1, 19; snout 3 in head; eye 5; interorbital space 3.5; maxillary 2.1; preorbital 4.8; scutes 27.

Body short, stout and compressed; head short and heavy; snout short and blunt, anterior profile rising abruptly to nape, dorsal outline strongly elevated from tip of snout to origin of spinous dorsal; ventral outline relatively straight; the portion of body covered by soft dorsal and anal fins tapering rapidly to the short caudal peduncle which is much depressed, its least depth about 2 in its least width; mouth large, nearly horizontal, jaws equal; moderately strong, caninelike teeth in a single row in each jaw, sparsely set, especially on upper jaw, a patch of villiform teeth on vomer; palatines and tongue with granular or villiform teeth; maxillary reaching a vertical at posterior edge of orbit; supplemental bone of maxillary well developed and slipping under the broad preorbital; eye moderate, about 1.5 in interorbital; adipose eyelid strongly developed posteriorly; interorbital and nape strongly keeled; fins moderate, origin of spinous dorsal somewhat behind base of pectoral, the spines folding in a groove, the longest 3 in head; anterior dorsal rays produced, their length 1.8 in head, equal to that of longest anal rays; caudal widely forked; pectoral ray very long and falcate, tip reaching about to base of seventh anal ray, length 2.8 in body and equaling base of soft dorsal; ventrals short, reaching vent, 2.1 in head; scales rather large, covering entire body, entire cheek, and upper part of opercle with a fine series, rest of head and nape naked; breast naked, except a small central patch of scales; lateral line with a strong regular arch above pectoral fin joining straight part over origin of anal, chord of arched part slightly shorter than length of straight part; scutes well developed on entire straight portion.

Color in alcohol greenish olivaceous above, becoming paler on sides and below; head greenish, silvery on cheek, lower jaw paler, head with a yellowish or brassy tinge, axil black; no spot on opercle; dorsals, anal, and caudal dusky; more or less yellow in life; soft dorsal and anal each with a narrow, pale border; edge of free portion of caudal paler, upper part of caudal peduncle dusky; pectorals and ventrals somewhat dusky; no spot on lower pectoral rays. (*Jordan and Evermann.*)

Not seen by me.

Habitat.—Distributed from Red Sea to the Hawaiian Islands.

A single specimen from Takao (*Jordan and Richardson*).

Remarks.—The above description is based upon a specimen from Honolulu, 22 inches long.

Genus **ALEPES** Swainson

Alepes SWAINSON, Natural History 2 (1839) 248 (type, *Alepes melanoptera* Swainson).

Hemicaranx BLEEKER, Versl. Kon. Ak. Wet. 14 (1862) 134 (type, *Caranx marginatus* Schlegel).

Carangops GILL, Proc. Acad. Nat. Sci. Phila. (1862) 431 (type, *Caranx heteropygus* Poey).

Body ovoid, compressed, dorsal and ventral outlines equally arched; maxillary very narrow, its greatest width scarcely three-fourths in eye. Head small. Teeth on both jaws in a single series, subequal in size, few or none on vomer, palatines, and tongue. Dorsal and anal fins rather low, not falcate, their bases with a conspicuous sheath of scales. Pectorals elongate, falcate. Scales small; lateral line more or less arched in front, scutes numerous, small.

Geographical distribution.—Guinea; Hawaiian Islands; tropical America; Cuba; Panama.

Alepes helvolus (Forster).

Scomber helvolus FORSTER, Descr. Anim. (1844) 415, Society Islands.

Caranx helvolus CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1833) 104; BLEEKER, Nat. Tijdschr. Ned. Ind. 8 (1855) 419, Amboina; GÜNTHER, Cat. Fishes 2 (1860) 443, Red Sea; JORDAN and EVERMANN, Bull. U. S. Fish Comm. 23 (1903) 196, Hawaii; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 26 (1906) 232, ? Tahiti, Hawaii; JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo 33 (1913) 130, Nagasaki.

Carangus helvolus SNYDER, Bull. U. S. Fish Comm. 22 (1902) 524, Honolulu.

Japanese names: *Oki-aji* (Japan); *kuro-aji* (Formosa).

Head 3.3 in length; depth 2.35; dorsal V, 1, 27; anal II, 1, 22; pectoral 20; ventral 1, 5; snout 2.95; eye 4; interorbital space 2.85; maxillary 2.35; ventral 3.33; pectoral 2.7 in length; keeled scutes 38.

Body ovate, rather high, slightly compressed, dorsal and ventral outlines equally arched; head small, slightly higher than long, top with a median dorsal crest, which reaches to interorbital space, top strongly convex; snout rather short, slightly longer than diameter of eye; mouth small, slightly oblique, its angle reaching a vertical through nostrils; upper lip thinner than lower; supplemental bone of maxillary exceedingly large, elongate, and triangular, its posterior angle reaching below anterior border of orbit; lower jaw protruding a little beyond upper; both jaws with a single series of minute, subequal, pointed teeth; vomer, palatines, and tongue edentulous; tongue rather large, pale yellowish white, roof of mouth of the same color, abruptly blue-black laterally; membranous flaps on both jaws internally touched by tongue; eye moderate, surrounded by an adipose eyelid, occupying middle of head, a horizontal from tip of snout passing through center of pupil; nostrils close together, in front of eye above; gill openings large; posterior corner of operculum obtusely pointed; gill rakers 3 + 14, rather stout, horny, flat, and elongate, longest 17.4 in eye.

Spinous dorsal exceedingly small, spines weak, folded in a groove, third the longest, 4.7 in head; soft dorsal elongate and low, rays gradually decreasing in length posteriorly, anterior ray the longest, 2 in head, more than anterior half of base of fin in a scaly sheath, last ray not reaching root of caudal lobe; pectoral elongate, falcate, reaching below middle of soft dorsal; ventrals rather short, inserted beneath pectoral base, scarcely reaching vent; preanal spines indistinct, entirely hidden beneath skin; anal similar to soft dorsal, inserted below eleventh ray of soft dorsal, anterior ray the longest, 2 in head, anterior one-third of base of fin in a scaly sheath, caudal deeply forked, upper lobe slightly longer than lower, tip of each lobe sharply pointed.

Scales thin and minute; breast naked; posterior part of eye densely scaled; cheeks very slightly scaled; a narrow, naked space on occiput, extending backward to spinous dorsal; lateral line slightly upcurved above pectoral, becoming straight beneath fifteenth ray of soft dorsal, running along middle of tail; scales on curved portion minute and numerous, scutes on straight portion enlarging posteriorly, rather small, each provided with a keel which forms a sharp ridge.

Color in alcohol pale bluish gray above, paler and golden below, more or less iridescent; opercular spot none; spinous dorsal grayish; soft dorsal yellow, margined with black; caudal yellowish gray, outer margin darker; anal grayish yellow; pectorals and ventrals yellow.

Total length, 326 millimeters. Described from a specimen from Tôkô, collected in April, 1920.

Habitat.—The present species is recorded from the Red Sea, Japan (Nagasaki), and the Hawaiian Islands.

Remarks.—The present species has been described under the name *Caranx helvolus.* It is reasonable to exclude this fish from *Caranx,* because of the presence of a single row of teeth on both jaws and the edentulous vomer, palatines, and tongue. It is rather nearer to *Selar* than to *Caranx.*

Genus **LEPTASPIS** Bleeker

Leptaspis BLEEKER, Verh. Bat. Gen. 24 (1852) 71 (type, *Caranx leptolepis* Kuhl and Van Hasselt).

Selaroides BLEEKER, Nat. Tijdschr. Ned. Ind. 2 (1851) 213 (type, *Caranx leptolepis* Kuhl and Van Hasselt).

Body oblong, not much elevated; upper jaw, vomer, and palatines edentulous; lower jaw with a single series of teeth; a fine band of villiform teeth on tongue. Otherwise essentially as in *Selar.*

Geographical distribution.—Tropical part of the Pacific Ocean from the Red Sea to Australia through the Indian Ocean and the Malay Archipelago.

Remarks.—The present genus was at first called *Selaroides*. The reason for changing to *Leptaspis* by the same author is not stated and not known.

Leptaspis leptolepis (Cuvier and Valenciennes).

Caranx leptolepis CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1828) 63, 64; CANTOR, Cat. Malayan Fishes (1849) 127; BLEEKER, Nat. and Geneesk. Arch. Ned. Ind. 2 (1845) 517, Batavia; Journ. Ind. Arch. 3 (1849) 71, Celebes; GÜNTHER, Cat. Fishes 2 (1860) 440, Malay Peninsula, Australia; DAY, Fishes of India (1876) 225, pl. 51, fig. 4, seas of India to the Malay Archipelago and Australia; JORDAN and EVERMANN, Proc. U. S. Nat. Mus. 25 (1903) 337, Keelung, Formosa; JORDAN and RICHARDSON, Bull. U. S. Fish Comm. 27 (1908) 250, Cavite, P. I.; Mem. Carnegie Mus. 4 (1909) 178, Keelung; Check-list Philip. Fishes (1910) 20, Manila, Cavite.

Selaroides leptolepis BLEEKER, Nat. Tijdschr. Ned. Ind. 2 (1851) 213, Banda; 57, Singapore; Act. Soc. Sci. Indo-Neerl. 8 (1860) 30, Sumatra; 39, Celebes; Ned. Tijdschr. Dierk. 2 (1865) 290, Amboina; Verh. Akad. Amsterdam 8 (1879) 2, China.

Leptaspis leptolepis BLEEKER, Verh. Bat. Gen. 24 (1852) 71, 87, Sunda-Molucca Islands.

Head 4.25 to 4.5 in total length; depth 3.67 to 4.25; dorsal VIII, 1, 24–26; anal II, 1, 21; pectoral 20; caudal 17; eye 3.5 in head, 1 to 1.25 in snout and in interorbital space; scutes 24 to 28.

Eyes with broad posterior adipose lids covering hind third of pupil, an anterior eyelid extending half across iris; jaws of about the same length, or lower one slightly longer; maxilla reaches to below anterior edge of first third of orbit; preorbital in its deepest part equals two-thirds diameter of orbit; fine teeth in anterior portion of lower jaw, none in upper, on vomer, or on palate; a fine band on tongue.

Dorsal spines weak, third and fourth longest and 0.5 height of body; anterior portion of soft dorsal highest and 2.33 in depth; pectoral rather longer than head, reaching to above fourth anal ray; ventral nearly reaches preanal spines; last dorsal and anal ray somewhat elongate.

Scales over body, breast, cheeks, and superiorly on head to above middle of eye; lateral line makes a very gentle curve, becoming straight below first third of soft dorsal; scales on lateral line about 95, keeled scales begin so gradually under last portion of soft dorsal that it is difficult to decide where they commence; the longest are below the commencement of the free portion of the tail, and about one-fourteenth the height of body.

Color silvery, a broad golden stripe from above eye to upper edge of tail; lower two-thirds of dorsal fin yellow, upper third dark. Outer third of anal white, the rest yellow; a large deep black spot on shoulder, said to be absent sometimes. (*Day.*)

Not seen by me.

Habitat.—Seas of India to the Malay Archipelago and Australia.

Two specimens from Keelung (*Jordan and Evermann*).

Genus **CARANGOIDES** Bleeker

Carangoides BLEEKER, Nat. Tijdschr. Ned. Ind. 1 (1851) 366 (type, *Caranx praeustus* Bennett).

Body ovate, compressed, rather high; head moderate, somewhat deeper than long. Mouth low and slightly oblique; maxillary with well-developed supplemental bone extending to below eye; premaxillaries protractile. Teeth persistent, all small, villiform on jaws, vomer, palatines, and tongue. Lateral line scarcely arched in front, straight portion rather short, with scutes of moderate strength. Gill rakers horny, flat, and long. Eye moderate, surrounded by adipose eyelids. Dorsal spines of moderate strength, connected; soft dorsal elongate, low, its base in a scaly sheath, anterior rays elevated. Preanal spines two. Pectorals elongate, falcate; finlets none.

Geographical distribution.—From the Red Sea to the Hawaiian Islands beyond through the Indian Ocean, Malay Archipelago, and Philippine Islands.

Key to species of Carangoides Bleeker.

a^1. Anterior rays of soft dorsal and anal elevated.
  b^1. Scutes 25; soft dorsal rays 1, 31; anal rays 1, 25. **C. hemigymnostethus.**
  b^2. Scutes 25 to 30; soft dorsal rays 1, 21–22; anal rays 1, 17. **C. malabaricus.**
a^2. Anterior dorsal and anal rays not elevated. Scutes 25 to 30; soft dorsal rays 1, 22–25; anal rays 1, 21–24 .... **C. equula.**

Carangoides hemigymnostethus Bleeker.

Carangoides hemigymnostethus BLEEKER, Nat. Tijdschr. Ned. Ind. 1 (1851) 364, Indian Archipelago; Verh. Bat. Gen. 24 (1852) 61, Sunda and Molucca Islands.

Caranx hemigimnostethus GÜNTHER, Cat. Fishes 2 (1860) 438, Sea of Batavia.

Head 3.63 in length; depth 2.2; dorsal VIII, 1, 31; anal II, 1, 25; pectoral 24; ventral 1, 5; snout 2.84 in head; eye 3.9; interorbital space 2.84; maxillary 2.43; ventral 1.89; pectoral 3.22 in length; scales about 120; scutes 25.

Body elongate, elliptical, compressed, dorsal outline evenly arched, ventral outline less convex, almost straight from tip of isthmus to origin of anal; head as long as deep, rather small, dorsal crest a little developed; snout longer than eye, obtusely pointed anteriorly; mouth small, oblique, its angle reaching a vertical through nostrils; supplemental bone of maxillary elongate, triangular; jaws subequal, lower very slightly shorter than upper; upper lip narrower than lower; teeth small, villiform on vomer, palatines, tongue, and jaws, those on jaws the largest and arranged in bands; eye rather small, slightly anterior, in axis of body; adipose eyelids slightly developed, surrounding outer margin of eye; nostrils close together, in front of eye above; gill openings moderate; gill rakers 9 + 21, rather flat and slender, longest 1.86 in eye.

Spinous dorsal small, spines weak and folded in a groove, the longest 3.65 in head; soft dorsal long and low, anterior six rays strongly elevated, tip rather filamentous, the longest as long as head, a well-developed scaly sheath anteriorly; pectorals elongate, falcate, tip reaching beyond origin of anal; ventrals short, inserted below hind part of pectoral base, reaching beyond vent; anal similar to soft dorsal but slightly shorter, anterior six rays prolonged, the longest nearly as long as head, scaly sheath well developed except posterior portion; caudal deeply forked, lobes subequal, with sharply pointed tip.

Scales minute, cheeks, postorbital region, and upper part of opercle scaled; breast naked; naked part on occiput extending backward to origin of spinous dorsal; lateral line slightly upcurved anteriorly, running along middle of tail; scutes rather small and fewer in number, developed only in posterior half of straight portion, posterior scutes with rather high keel pointed posteriorly.

Color in alcohol bluish gray above, paler and silvery below, no opercular spot; spinous dorsal grayish; other fins yellow, soft dorsal, caudal, and anal margined with black.

Total length, 232 millimeters. Described from a specimen obtained at Taihoku fish market, locality unknown.

Habitat.—Seas of Batavia; Sunda-Molucca Islands; seas of India.

Carangoides malabaricus (Bloch and Schneider).

Scomber malabaricus BLOCH and SCHNEIDER, Syst. Ichth. (1801) 31.

Scomber talam parah RUSSELL, Descr. & Fig. (1803) 37, pl. 150.

Caranx caeruleo-pinnatus RÜPPELL, Atlas Fische (1828) 100, Red Sea.

Caranx malabaricus CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1833) 121; RICHARDSON, Ichth. China (1846) 275, China; CANTOR, Cat. Malayan Fishes (1849) 128; GÜNTHER, Cat. Fishes 2 (1860) 436, Madras, Pinang, Moluccas, China, Australia; DAY, Fishes of India (1876) 221, pl. 50, fig. 2, Red Sea; SENO, Report Form. Fish. (1910) 118, pl. 7, fig. 2, pl. 8, fig. 1, Takao, Bako, seas of India to the Malay Archipelago; FOWLER, Proc. Acad. Nat. Sci. Phila. (1905) 83, Sumatra; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 178, Keelung, Formosa; SEALE, Philip. Journ. Sci. § D 9 (1914) 62, Hongkong.

Carangus malabaricus JORDAN and EVERMANN, Proc. U. S. Nat. Mus. 25 (1903) 337, Keelung, Formosa.

Carangoides malabaricus FOWLER, Journ. Acad. Nat. Sci. Phila. 12 (1904) 513, Sumatra.

Carangoides talamparah BLEEKER, Nat. Tijdschr. Ned. Ind. 3 (1852) 57, Singapore; Verh. Bat. Gen. 24 (1852) 64, Sunda-Molucca Islands; 25 (1854) 46, Bengal and Hindostan.

Carangoides talamparoides BLEEKER, Verh. Bat. Gen. 24 (1852) 91, Sunda-Molucca Islands; Nat. Tijdschr. Ned. Ind. 3 (1852) 579, Sumatra; Act. Soc. Sci. Indo-Neerl. 8 (1860) 30, Sumatra; GÜNTHER, Cat. Fishes 2 (1860) 437, Ceylon.

Head 3.2 in length; depth 2.29; dorsal VIII, 1, 21; anal II, 1, 17; pectoral 19; ventral 1, 5; snout 2.85 in head; eye 3.74; interorbital space 3.9; maxillary 2.4; ventral 2.95; pectoral 2.9 in length; scutes 25.

Body rhomboidal, rather deep, strongly compressed, dorsal outline evenly arched, ventral outline less arched than dorsal, from tip of lower jaw to origin of anal very slightly convex; preventral and postventral edge more or less trenchant; head deeper than high, median dorsal line sharp, not forming a crest; snout conic, compressed and pointed anteriorly, preorbital very deep; mouth low and slightly oblique, its angle reaching a vertical through nostrils; lower jaw more or less protruding beyond upper, lips subequal; supplemental bone of maxillary rather small, triangular; jaws, vomer, palatines, and tongue with bands of villiform teeth; eye superior, occupying middle of head; adipose eyelid a little developed, surrounding outer margin of eye; nostrils close together, approximated to eye; interorbital space narrow, strongly convex, with sharp median edge; gill openings large; gill rakers 4 + 17, those on lower limb flat and long, tip rather blunt, the longest 2.1 in eye.

Spinous dorsal lower than soft dorsal, spines of moderate strength, third the longest, 2.76 in head; soft dorsal elongate, rather low, anterior three rays elevated but not filamentous, the longest 1.86 in head, inserted midway between tip of snout and base of caudal, last ray scarcely reaching root of caudal lobe; pectoral elongate, falcate, reaching middle of base of soft dorsal below; ventrals minute, inserted behind base of pectoral, reaching beyond vent; anal similar to soft dorsal, inserted below fourth dorsal ray, longest ray 1.9 in head; caudal deeply forked, short and high, lobes equal, with sharply pointed tip.

Scales minute; breast naked; cheeks, postorbital, and upper part of opercle scaled; lateral line broadly upcurved above pectoral, becoming straight behind middle of soft dorsal base, straight portion very short, provided with rather weak scutes, largest on caudal peduncle, keels but little developed; base of caudal with two lateral keels on either side of lateral line.

Color in alcohol bluish silvery above, paler and whitish below; opercular spot blackish brown; spinous dorsal grayish; soft dorsal and caudal yellow, margined with dark; other fins yellowish.

Total length, 327 millimeters. Described from a specimen purchased at the Taihoku fish market in December, 1918.

Habitat.—Distributed from the Red Sea, through all the East Indian seas, Philippine Islands, to the coast of Australia. Jordan and Evermann recorded the species from Keelung, and Seno from Takao and Bako, Pescadores Islands.

Three specimens from Anpin near Tainan; three large specimens from the Taihoku fish market.

Remarks.—The present species is commonest in Formosa and is valued as a food fish.

Carangoides equula (Temminck and Schlegel).

Caranx equula TEMMINCK and SCHLEGEL, Fauna Japonica, Poiss. (1844) 111, pl. 60, fig. 1, Nagasaki; GÜNTHER, Cat. Fishes **2** (1860) 438, Sea of Japan; JORDAN and SNYDER, Proc. U. S. Nat. Mus. (1900) 353, Yokohama; SNYDER, Proc. U. S. Nat. Mus. **42** (1912) 411, Kagoshima; JORDAN and THOMPSON, Mem. Carnegie Mus. **4** (1914) 240, Osaka, Shimonoseki, Misaki; JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo **33** (1913) 129, Tokyo to Nagasaki.

Carangus equula JORDAN and SNYDER, Proc. U. S. Nat. Mus. **23** (1901) 749, Yokohama; JORDAN and STARKS, Bull. U. S. Fish Comm. (1904) 585, Suruga Bay; SMITH and POPE, Proc. U. S. Nat. Mus. **31** (1906) 466, Kochi.

Carangoides equula BLEEKER, Verh. Bat. Gen. **26** (1854) 102, Japan.

Japanese names: *Hira-aji; kaiwari.*

Head 3.2 in length; depth 2.35; dorsal VIII, 1, 25; anal II, 1, 34; pectoral 17; ventral 1.5; snout 3.13 in head; eye 3.1; interorbital space 3.13; maxillary 2.37; ventral 2.85; pectoral 2.8 in length; scales about 65; scutes 30.

Body ovate, rather high, compressed, dorsal outline much more curved than that of ventral, from nape to tip of snout nearly straight, rather trenchant, from tip of lower jaw to origin of anal broadly curved; head conic, pointed anteriorly, somewhat deeper than long; snout rather short, nearly as long as diameter of eye, obtusely pointed anteriorly; mouth low, slightly oblique, its angle reaching a vertical through anterior border of orbit; supplemental bone of maxillary elongate, triangular; lips subequal; lower jaw very slightly longer than upper; both jaws with villiform teeth in bands, villiform teeth on vomer, palatines, and tongue; eye large, slightly anterior and superior, surrounded by adipose eyelids; nostrils close together, in front of eye above, oval; gill openings moderate; gill rakers 5 + 22, those on lower limb flat and horny, obtusely pointed, rakers on upper limb very slender, the longest 2.2 in eye.

Spinous dorsal slightly higher than soft dorsal, spines of moderate strength, third the longest, 2.3 in head; a sharply pointed recumbent spine before spinous dorsal; soft dorsal elongate, rays gradually decreasing in length posteriorly, anterior rays not elevated, the longest 2.55 in head; scaly sheath along base of soft dorsal well developed; pectoral elongate, falcate, scarcely reaching middle of anal base; ventrals rather short, inserted below hind part of pectoral base, reaching vent; anal similar to soft dorsal, base of fin in a rather high scaly sheath, anterior ray the longest, 2.55 in head; caudal short, deeply forked, lobes equal, with sharply pointed tip.

Scales minute; breast scaly; cheeks, postorbital, and upper part of opercle scaled; lateral line broadly upcurved above pectoral, becoming straight below posterior two-fifths of base of soft dorsal; scutes on straight portion only, rather weak, largest on caudal peduncle, keel on each scute sharply pointed posteriorly.

Color bluish silvery above, paler and yellowish below, underparts whitish; snout, top of head, and preoperculum purplish; spinous dorsal pale purplish gray; soft dorsal dark gray above, much paler and hyaline below, margined with white anteriorly; pectorals transparent, yellowish, with purplish base; ventrals yellowish green, margined with white; anal distinctly margined with white, greenish yellow with dusky tinge apically; caudal base purplish, fin yellowish gray, margined with black.

Total length, 265 millimeters. Described from one of eight specimens obtained at the Taihoku fish market, probably from Keelung.

Habitat.—Abundant in the southern part of Japan, from Nagasaki to Tokyo.

Remarks.—The present species is essentially identical with the description of Günther. The number of rays of the soft dorsal is variable, namely, from 22 to 25, and that of the anal from 21 to 24.

Genus **CITULA** Cuvier

Citula CUVIER, Regne Anim. (1817) 315 (type, *Sciaena armata* Forskål).

Body ovate, compressed, dorsal and ventral outlines equally arched. Mouth moderate, slightly oblique; maxillary with triangular supplemental bone, extending to below anterior part of eye. Jaws subequal, with bands of villiform teeth; vomer, palatines, and tongue with teeth in villiform bands. Eyes moderate, surrounded by thin adipose eyelids. Dorsal spines rather weak, folded in a groove; soft dorsal and anal elongate and low, anterior rays elevated, first ray prolonged and filamentous; pectorals falcate. Scales present, minute. Lateral line moderately upcurved above pectoral, becoming straight behind middle of soft dorsal base; scutes perceptible only in posterior part of straight portion of lateral line, rather small and weak.

Geographical distribution.—Tropical Pacific from east coast of Africa to Mexico and Panama.

Key to species of Citula Cuvier.

a^1. Soft dorsal with 21 rays; anal with 17 rays; scutes 20 to 23. Gill rakers slender and numerous, 20 or more on lower limb of first arch.
  b^1. Head 3 in length; depth of body more than 2 in length.... **C. rastrosus.**
  b^2. Head 3.85 in length; depth of body less than 2 in length. **C. pescadorensis.**
a^2. Gill rakers roughly set, rather stout, 14 on lower limb of first arch; depth of body about 2 in length.. **C. armata.**

Citula rastrosus (Jordan and Snyder).

Caranx rastrosus JORDAN and SNYDER, Mem. Carnegie Mus. 4 (1909) 37, Takao, Formosa; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 178, Takao; Check-list Philip. Fishes (1910) 20, Cavite, P. I.

Head 3 in length; depth 2.1; dorsal VIII, 1, 21; anal II, 1, 17; pectoral 20; ventral 1, 5; snout 2.8; eye 3.5; interorbital space 3.9; maxillary 2.34; ventral 2.69; pectoral 2.55 in length; scutes 23.

Body deep and fusiform, compressed, dorsal and ventral outlines equally arched, dorsal median ridge rather sharp, extending from origin of spinous dorsal to interorbital space; head moderate, deeper than long, subconic, compressed; snout longer than diameter of eye, pointed anteriorly; mouth oblique and low, its angle reaching a vertical through nostrils; supplemental bone of maxillary triangular; jaws subequal, lower slightly protruding beyond upper; jaws, vomer, palatines, and tongue with bands of villiform teeth; eye moderate, superior, occupying middle of head; adipose eyelid thin, slightly covering outer margin of eye; nostrils close together, in front of eye, greatly separated from tip of snout; gill openings moderate; gill rakers 8 + 20, rather long, with obtusely pointed tip, inner lateral edge finely ciliated, the longest 2 in eye.

Spines of spinous dorsal of moderate strength, second and third subequal in length, 2.8 in head, last two spines subequal in size, short and free; soft dorsal low and elongate, anterior part elevated and filamentous, tip when depressed scarcely reaching end of base of fin; pectorals elongate, falcate, extending backward to middle of soft dorsal below; ventrals short, inserted a little behind hind part of pectoral base below, scarcely reaching more than halfway to anal spine; anal similar to soft dorsal, anterior rays elongate, filamentous, when depressed reaching middle of base of fin; caudal deeply forked, lobes equal, tip sharply pointed.

Body with very small scales; throat, breast, and a considerable area including base and axil of pectoral naked; cheeks, postorbital space, and upper part of opercle scaled; naked part on occiput extends backward to origin of spinous dorsal; lateral line broadly upcurved above pectoral, becoming straight behind middle of base of soft dorsal, scutes on straight portion only, very weak, each with a low keel pointed posteriorly; base of caudal with two lateral keels on each side of median keel, gradually converging posteriorly.

Color in alcohol bluish silvery above, silvery and whitish below; opercular spot distinct; spinous dorsal pale gray; rest of fins yellowish; caudal margined with black.

Total length, 260 millimeters. Described from a specimen from Tôkô.

Habitat.—Formosa (Takao and Tôkô) and Philippine Islands.

Remarks.—My specimens from Tôkô differ slightly from the type, the median rays of the soft dorsal being not filamentous. Presumably the example described by Jordan and Snyder as the type of the present species was a male specimen, because in the case of *Citula armata* such difference also exists between male and female.

Citula pescadorensis sp. nov. Plate 1, fig. 2.

Caranx armatus SENO, Report Form. Fish. (1910) 118, pl. 7, fig. 3, Bako, Pescadores Islands (not of Forskål).

Head 3.85 in length; depth 1.89; dorsal VIII, 1, 21; anal II, 1, 17; pectoral 20; ventral 1, 5; snout 3 in head; eye 3; interorbital space 2.5; maxillary 2.15; pectoral 3.3 in length; scutes 20.

Body oval, deep, strongly compressed, dorsal and ventral outlines equally arched, back trenchant from origin of spinous dorsal to interorbital space, profile from tip of snout to interorbital space slightly concave; head much deeper than long, compressed; snout short, rounded anteriorly; mouth oblique, its angle scarcely reaching a vertical through anterior border of orbit; supplemental bone of maxillary triangular; lower jaw slightly protruding beyond upper; jaws, vomer, palatines, and tongue with bands of villiform teeth, those of the outer series on upper jaw somewhat larger; eye rather small, slightly anterior, occupying the longitudinal axis of head; adipose eyelid thin, surrounding outer margin of eye; nostrils close together, in front of eye, nearer former than tip of snout; gill openings large; gill rakers 7 + 23, slender and closely set, inner lateral margin finely ciliated, the longest 1.82 in eye.

Spinous dorsal folded in a groove, spines rather strong, third the longest, 1.88 in head; a recumbent spine before origin of spinous dorsal; soft dorsal elongate and low, anterior part falcate, first ray prolonged, filiform, reaching far beyond middle of base of fin; pectorals falcate, extending backward to anterior one-third of soft dorsal base below; ventrals long, reaching origin of anal; anal similar to soft dorsal, anterior part falcate, longest ray 1.24 in head; caudal rather small, deeply forked, lobes equal, with sharply pointed tips.

Scales minute, not deciduous; throat, breast, pectoral base, and hind part of opercular angle naked; cheeks, postorbital part and upper part of opercle scaled; lateral line deeply arched above pectoral, becoming straight opposite middle of soft dorsal base; posterior two-thirds of straight portion provided with weak scutes, keel low, clearly perceptible on caudal peduncle only.

Color in alcohol grayish above, silvery and whitish below; sides with six crossbands of dark color, the last on caudal peduncle; opercular spot distinct; spinous dorsal pale gray; soft dorsal and anal yellowish, elevated part dark; caudal yellowish, margined with black; pectorals yellowish; ventral fuscous with white rays.

Total length, 126 millimeters. Described from one of two specimens from Bako, Pescadores Islands, collected in June, 1910. Cotype, 120 millimeters in length.

Remarks.—The present species is distinguished from *Citula armata* by the much deeper body.

Citula armata (Forskål).

Sciaena armata FORSKÅL, Descr. Anim. (1775) 53.

Citula armata RÜPPELL, Atlas Fische (1828) 103, Red Sea; BLEEKER, Ned. Tijdschr. Dierk. **1** (1863) 242, Obi; **2** (1865) 174, Siam; 191, Ceram; 290, Amboina; **4** (1873) 131, Amboina; Rech. Fauna Madagascar (1875) 99, Madagascar; Arch. Neerl. Sci. Nat. **13** (1878) 50, New Guinea; Verh. Akad. Amsterdam **18** (1879) 14, Japan; JORDAN and EVERMANN, Proc. U. S. Nat. Mus. **25** (1903) 338, Formosa; FOWLER, Proc. Acad. Nat. Sci. Phila. (1905) 83, Sumatra; JORDAN and STARKS, Ann. Carnegie Mus. **11** (1917) 443, Ceylon.

Caranx armatus CUVIER and VALENCIENNES, Hist. Nat. Poiss. **9** (1828) 127; CANTOR, Cat. Malayan Fishes (1849) 131; GÜNTHER, Cat. Fishes **2** (1860) 453, Pinang, Moluccas, Sumatra, China; DAY, Fishes of Malabar (1865) 89, Malabar; KLUNZINGER, Verh. z. b. Ges. Wien (1871) 445, Red Sea; DAY, Fishes of India (1876) 223, Red Sea, east coast of Africa, seas of India to beyond the Malay Archipelago; JORDAN and SEALE, Bull. U. S. Bur. Fisheries **26** (1907) 14, Cavite, P. I.; JORDAN and RICHARDSON, Bull. U. S. Bur. Fisheries **27** (1908) 250, Manila; JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo **33** (1913) 130, Japan.

Citula plumbea QUOY and GAIMARD, Voy. Freyc. Zool. Poiss. (1824) 361.

Caranx plumbeus JORDAN and RICHARDSON, Mem. Carnegie Mus. **4** (1909) 179, Formosa; JORDAN and SEALE, Bull. U. S. Bur. Fisheries **25** (1906) 14, Samoa.

Caranx ciliaris CUVIER and VALENCIENNES, Hist. Nat. Poiss. **9** (1828) 129; TEMMINCK and SCHLEGEL, Fauna Jap. Poiss. (1842) 112, Japan; RICHARDSON, Ichth. China (1846) 276, China.

Carangoides citula BLEEKER, Nat. Tijdschr. Ned. Ind. **2** (1851) 213, Celebes.

Carangoides armatus BLEEKER, Nat. Tijdschr. Ned. Ind. **18** (1895) 354, Bawean.

Japanese name: *Yoroi-aji.*

Head 3.48 in length; depth 2.05; dorsal VIII, 1, 21; anal II, 1, 17; pectoral 17; ventral 1, 5; snout 3.04 in head; eye 3.04; interorbital space 3.18; maxillary 2.18; ventral 2; pectoral 2.55 in length; scutes 22.

Body ovoid, rather deep, compressed, dorsal and ventral outlines nearly equally arched, dorsal profile from tip of snout to interorbital space very slightly concave, back trenchant from origin of spinous dorsal to interorbital space; head much deeper than long, conic; snout as long as diameter of eye, obtusely pointed anteriorly; preorbital rather deep; mouth moderate, its angle reaching a vertical through nostrils; supplemental bone of maxillary large, triangular, upper edge partially slipping beneath preorbital; lower jaw longer than upper; lips subequal; jaws, vomer, palatines, and tongue with bands of villiform teeth; eye moderate, slightly superior and anterior; adipose eyelid slightly developed, surrounding outer margin of eye only; interorbital space strongly convex, distance to median ridge shorter than diameter of eye; nostrils large, close together, in front of eye, much nearer to orbit than tip of snout; gill openings large, membranes entirely separated; gill rakers 8 + 14, rather roughly set, flat and long, with obtusely pointed tip, the longest 1.92 in eye.

Dorsal spines of moderate strength, third the longest, 1.29 in head, when depressed reaching origin of soft dorsal; soft dorsal elongate and low, much elevated anteriorly, first ray prolonged, rather filiform, reaching beyond middle of base, sheath at base of fin much developed, high; pectorals elongate, falcate, reaching middle of soft dorsal base; ventrals short, extending backward more than midway to origin of preanal spine; anal similar to soft dorsal, anterior rays much elevated, first the longest, filiform, scarcely reaching end of fin; caudal moderately forked, rather short, lobes equal, tip sharply pointed.

Scales minute, not deciduous; throat and breast naked; cheeks, postorbital part, and upper part of opercle scaled; naked part on occiput extending backward to origin of spinous dorsal; lateral line broadly upcurved above pectoral, becoming straight below middle of soft dorsal base, a conspicuous dorsal branch extending upward to occiput and reaching backward to near origin of soft dorsal; scutes rather weak, occupying posterior two-thirds of straight portion, largest on caudal peduncle, keels weak.

Color in alcohol bluish silvery above, paler and golden below; opercular spot distinct; spinous dorsal pale gray; soft dorsal and caudal yellowish, margined with black, filiform rays of former black; rest of fins yellowish.

Total length, 297 millimeters. Described from a female specimen purchased at the Taihoku fish market on December 24, 1918.

Habitat.—Distributed from the Red Sea, through all the Indian seas, to the coasts of New Guinea.

Five specimens (two females and three males) from the Taihoku fish market. Three specimens from Anping.

Jordan and Richardson recorded the present species under the name *Caranx plumbeus.*

Remarks.—In male specimens the middle rays of the soft dorsal, about ten, are exceedingly elongate and filiform.

Genus **ALECTIS** Rafinesque

Gallus LACÉPÈDE, Hist. Nat. Poiss. 4 (1802) 583 (type, *Gallus virescens* Lacépède).

Alectis RAFINESQUE, Analyse de la Natur (1815) 84 (substitute for *Gallus,* preoccupied).

Blepharis CUVIER, Regne Anim. ed. 1 2 (1817) 322 (type, *Zeus ciliaris* Bloch).

Scyris CUVIER, Regne Anim. ed. 2 2 (1829) 209 (type, *Scyris indica* Cuvier and Valenciennes).

Gallichthys CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1833) 168 (substitute for *Gallus,* preoccupied).

Blepharichthys GILL, Proc. Acad. Nat. Sci. Phila. (1861) 36 (type, *Zeus crinitus* Mitchill) (substitute for *Blepharis,* preoccupied).

Body rhomboidal, deep, strongly compressed, more or less completely covered with minute embedded scales, sometimes apparently naked; scutes on straight portion of lateral line enlarged, bony, and spinous, but much less developed. Mouth moderate, with bands of villiform teeth on jaws, vomer, palatines, and tongue; first dorsal fin little developed, the spines short and rudimentary, mostly disappearing with age. Soft dorsal and anal similar to each other; first five or six rays of each fin elongate and filiform in the young, becoming shorter with age. Ventral fins elongate in the young, short in the adult; pectorals falcate; no finlets; caudal peduncle narrow, caudal widely forked. Gill rakers moderate, stout. Young individuals are almost orbicular in form, with the filaments excessively long.

Geographical distribution.—From Red Sea to beyond Hawaiian Islands and West Indies.

Key to species of Alectis Rafinesque.

a^1. Eye small, 1.5 to 1.75 snout.
  b^1. Caudal peduncle with no lateral keels.................................. A. gallus.
  b^2. Caudal peduncle with two lateral keels on either side of lateral line. A. major.
a^2. Eye large, 0.75 to 1 in snout; caudal peduncle with no lateral keels. A. ciliaris.

Alectis gallus (Linnæus).

Zeus gallus LINNÆUS, Syst. Nat. 1 (1758) 454.
Gallus virescens LACÉPÈDE, Hist. Nat. Poiss. 4 (1803) 583.
Blepharis galichthys SWAINSON, Nat. Hist., Fishes (1839) 250.
Carangoides galichthys BLEEKER, Verh. Bat. Gen. 24 (1852) 68, Sunda, Molucca Islands.
Caranx gallus GÜNTHER, Cat. Fishes 2 (1860) 455, Red Sea to Indian seas (in part); DAY, Fishes of Malabar (1865) 91, Malabar; KLUNZINGER, Verh. z. b. Ges. Wien (1871) 454, Red Sea; GÜNTHER, Fische der Südsee (1873) 135, Indian Ocean and Archipelago to north Australia.
Citula gallus BLEEKER, Ned. Tijdschr. Dierk. 1 (1863) 242, Obi; 2 (1865) 174, Siam; 191, Ceram; 290, Amboina; Versl. Akad. Amsterdam (2) 2 (1868) 293, Bintang; 300, Waigiou; Ned. Tijdschr. Dierk. 4 (1873) 132, China; Rech. Fauna Madagascar (1875) 99, Madagascar.

Head 3.3 in length: depth 1.38; dorsal VI, 1, 18; anal 0, 1, 16; pectoral 18; ventral 1, 5; snout 1.78; eye 3.4; interorbital space 3.4; maxillary 3.9; scutes 9.

Body rhomboidal, much compressed and elevated, deepest in front of origin of soft dorsal, dorsal profile from tip of snout to occiput steep and weakly concave, that of occiput convex, becoming nearly straight, ascending to origin of soft dorsal, then abruptly descending to caudal peduncle; proventral and postventral abdominal edge trenchant, markedly convex, making two different curves indented behind ventral roots, from origin of anal to caudal peduncle nearly straight, ascending obliquely backward; head much deeper than long, median crest on occiput developed, strongly compressed; snout sharply pointed anteriorly, preorbital exceedingly deep; mouth small, oblique, its angle not reaching a vertical through anterior border of nostril; lower jaw protruding beyond upper; supplemental bone of maxillary thin and elongate, triangular, anterior part slipping beneath preorbital; jaws, vomer, palatines, and tongue with bands of villiform teeth; nostrils rather superior, in front of eye above, oval and slightly separated; the gill openings large, extending obliquely forward; gill rakers 8 + 23, closely set, rather slender, the longest 2.4 in eye.

Spinous dorsal rudimentary, spines minute and subequal in size; soft dorsal commences at the most elevated point of back, with roughly set rays, of which anterior eight are elongate and filiform, first ray reaching to tip of caudal; pectoral elongate, falcate, reaching to thirteenth dorsal ray beneath; ventrals much in advance of base of pectoral, two outer rays elongate, filiform, extending to caudal peduncle; anal similar to soft dorsal, first three rays elongate, but not so much so as those of dorsal; caudal deeply forked, lobes equal, tip sharply pointed.

Body naked except along lateral line; lateral line strongly upcurved above pectoral, becoming straight below tenth dorsal ray, keeled scutes visible only along posterior half of straight portion, weak and minute.

Color in alcohol grayish above, lower half whitish and silvery, sides with six crossbands of dark color, the last one on caudal peduncle; all fins whitish except the filamentous rays, which are dark or black.

Total length, 163 millimeters. Described from one of four specimens purchased at the Taihoku fish market in November, 1912. Locality unknown.

Habitat.—Red Sea to the Malay Archipelago beyond through the Indian Ocean.

Alectis major (Cuvier and Valenciennes).

Zeus gallus BLOCH, Ichth. (1785) pl. 192, fig. 1 (not of Linnæus).

Gallichthys major CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1827) 168, pl. 254; RICHARDSON, Ichth. China (1845) 271.

Scyris indica RÜPPELL, Atlas Fische (1828) 128, pl. 33, fig. 1, Red Sea.

Alectis ciliaris JORDAN and EVERMANN, Proc. U. S. Nat. Mus. 25 (1903) 338, Keelung, Formosa.

Alectis major JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 180, Takao, Formosa.

Pectoral 0, 18; ventral 1, 5; dorsal 6, 14; anal 3, 15; caudal 24.

Head and opercles entirely naked, silvery; body covered with minute scales, silvery. Spines of first dorsal short and hidden beneath skin. First ray of second dorsal not branched or articulated; the following five rays articulated but not branched, elongate and filiform, reaching end of caudal, second ray the longest, others gradually decreasing in length, next three branched and filiform, the rest of the rays branched, but not elongate. First ray of anal spinous, second not articulated, elongate and filiform, third ray also filiform but much shorter than former, fourth branched and filiform, rest of the rays, thirteen in number, branched, subequal in height. Pectoral elongate, falcate, with eighteen rays. Ventral with one short spine and five branched rays, its second ray nearly half as long as depth of body. All the fins yellowish and hyaline, ventrals margined with black. Gill membranes with six striæ (branchiostegals ?). Mouth small, edentulous (Rüppell's *Scyris indicus*).

Not seen by me.

Remarks.—Jordan and Richardson identified two specimens of *Alectis* from Takao as *Alectis major*, which is identical with *Zeus gallus* Bloch (not of Linnæus) and with *Scyris indica* Rüppell, including *Alectis ciliaris* of Jordan and Evermann recorded in 1903 from Formosa. According to Rüppell, *Scyris indica* is very closely related to *Gallus alexandrinus* which is the type of Cuvier's genus *Scyris*, differing from it in having long ventrals margined with black and two additional longitudinal keels on either side of lateral line on caudal peduncle.

Rüppell's *Scyris indicus*, figured in his Atlas, seems to be identical with *Alectis gallus* in having deep preorbital and shorter filamentous rays. However, all the specimens that I have identified with *gallus* are not provided with additional keels on the caudal peduncle, thus distinctly differing from the present species. The occurrence of *Alectis major* in the waters of Formosa is somewhat dubious at present.

Alectis ciliaris (Bloch).

Zeus ciliaris BLOCH, Ichth. 6 (1788) 27, pl. 191, East Indies; BLOCH and SCHNEIDER, Syst. Ichth. (1801) 94.

Caranx ciliaris GÜNTHER, Cat. Fishes 2 (1860) 44, Amboina, India; DAY, Fishes of Malabar (1865) 90, Red Sea, seas of India, Malaysia, China; GÜNTHER, Fische der Südsee (1873) 135, east coast of Africa; KLUNZINGER, Verh. z. b. Ges. Wien (1871) 454, Red Sea; DAY, Fishes of India (1876) 224, India.

Scyris ciliaris KLUNZINGER, Fische des Rothen Meeres 1 (1884) 101.

Alectis ciliaris JORDAN and EVERMANN, Fishes North and Mid. Am. 1 (1896) 931, tropical America; Bull. U. S. Fish Comm. 23 (1903) 200, fig. 78, Honolulu; JENKINS, Bull. U. S. Fish Comm. 22 (1903) 447, Hawaiian Islands; JORDAN and SNYDER, Proc. U. S. Nat. Mus. 27 (1904) 942, Honolulu; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 26 (1906) 235, Hawaii, Samoa, New Ireland, Tahiti, Palau Island, New Guinea, Solomon Islands; Bull. U. S. Fish Comm. 26 (1907) 14, Cavite, Philippines; SNYDER, Proc. U. S. Nat. Mus. 42 (1912) 411, Misaki; 496, Riu Kiu; JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo 33 (1913) 130, Japan; JORDAN and THOMPSON, Mem. Carnegie Mus. 6 (1914) 240, Misaki, Yokohama.

Scomber filamentosus MUNGO PARK, Trans. Linn. Soc. London 3 (1797) 36, Sumatra.

Blepharis fasciatus RÜPPELL, Atlas Reis. Nördl. Af. (1828) 129, pl. 33, fig. 2, Red Sea.

Carangoides blepharis BLEEKER. Verh. Bat. Gen. 24 (1852) 67, Batavia; 25 (1853) 4, Japan; Nat. Tijdschr. Ned. Ind. 18 (1858) 147, Bali; Act. Soc. Sci. Indo-Neerl. 8 (1860) 30, Sumatra; 39, Celebes.

Japanese name: *Itohiki-dai* or *kanzashi-dai.*

Head 2.96 in length; depth 1.28; dorsal VI, 1, 19; anal II, 1, 16; pectoral 20; ventral 1, 5; snout 3.33 in head; maxillary 2.65; scutes 18.

Body rhomboidal, much compressed and deep, highest between the elevated bases of dorsal and anal, dorsal profile triangular, from origin of soft dorsal to caudal peduncle nearly straight and oblique, the profile from tip of snout to interorbital space steep and nearly straight, ascending backward to origin of soft dorsal, making a broad curve; dorsal median ridge rather sharp; ventral profile from tip of lower jaw to hind margin of orbit below slightly concave, proventral and postventral part of abdomen nearly straight, more or less trenchant, from origin of anal to caudal peduncle nearly straight, obliquely ascending backward; head rather small, much deeper than long, compressed; snout rather short, obtusely pointed anteriorly, depth of preorbital moderate; mouth oblique, its angle reaching a vertical through middle of nostrils; supplemental bone of maxillary rather small, triangular, upper edge slipping below preorbital; jaws subequal in length, lower protruding slightly beyond upper; teeth on jaws, vomer, palatines, and tongue in villiform bands; eye large, above axis of body, very slightly anterior, adipose eyelid moderately developed before and behind eye; nostrils close together, approximated to eye; gill openings large, extending obliquely forward; gill rakers 4 + 14, those on lower limb rather stout, flat and sharply pointed, the longest 3.84 in eye.

Spinous dorsal obscure, spines minute and subequal in size; soft dorsal elongate, anterior seven rays prolonged and filiform, first and second rays exceedingly long, much longer than body; pectoral falcate, reaching behind middle of dorsal base; ventrals inserted beneath pectoral, reaching more than halfway to anal; anal similar to soft dorsal, first five rays elongate and filiform.

first and second nearly as long as dorsal filaments; caudal rather short and deep, moderately forked, lobes subequal.

Body entirely naked; lateral line strongly upcurved above pectoral, becoming straight below eleventh dorsal ray, scutes very weak and minute, occupying posterior half of straight portion.

Color in alcohol pale bluish silvery above, paler and silvery below; a dark blotch on hind part of opercle, sides with five dark crossbands; fins all pale, a large black blotch on base of third to seventh dorsal rays; filaments of dorsal and anal rays black.

Total length, 134 millimeters. Described from a specimen obtained at the Taihoku fish market in January, 1919. Three fine specimens from Pescadores Islands, three others from the Taihoku fish market.

Habitat.—Distributed from the Red Sea to the Hawaiian Islands through the seas of India and Malay Archipelago, and also found on both coasts of tropical America.

Genus **GNATHANODON** Bleeker

Gnathanodon BLEEKER, Nat. Tijdschr. Ned. Ind. 1 (1851) 160 (type, *Scomber speciosus* Forskål).

Hypocaranx KLUNZINGER, Fische des Rothen Meeres (1884) 92 (type, *Scomber speciosus* Bloch).

This genus differs from *Caranx* mainly in the dentition, the teeth being very small, granular, and entirely lost with age. The maxillary is broad, the body compressed, and the fins are without filaments.

Geographical distribution.—Tropical parts of the Pacific and Indian Oceans, Cape San Lucas to the Red Sea.

Gnathanodon speciosus (Forskål).

Scomber speciosus FORSKÅL, Descr. Anim. (1775) 54.

Caranx speciosus LACÉPÈDE, Hist. Nat. Poiss. 3 (1798) 72, pl. 1, fig. 1; CUVIER and VALENCIENNES, Hist. Nat. Poiss. 9 (1827) 130; CANTOR, Cat. Malayan Fishes (1849) 133; GÜNTHER, Cat. Fishes 2 (1860) 444, Madras, Philippine Islands, Borneo, Sunda Sea, Pinang Sea, Australia; DAY, Fishes of Malabar (1865) 84, Malabar; KLUNZINGER, Verh. z. b. Ges. Wien (1871) 455, Red Sea; DAY, Fishes of India (1876) 226, Red Sea to Malay Archipelago; JENKINS, Bull. U. S. Fish Comm. 22 (1903) 447, Hawaiian Islands; JORDAN and EVERMANN, Bull. U. S. Fish Comm. 23 (1903) 197, Honolulu; SNYDER, Bull. U. S. Fish Comm. (1904) 525, Honolulu; JORDAN and SEALE, Bull. U. S. Fish Comm. 26 (1907) 14, Cavite, P. I.; 64, Philippines; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 178, Takao, Formosa.

Gnathanodon speciosus BLEEKER, Nat. Tijdschr. Ned. Ind. 1 (1851) 160, Banka; 2 (1851) 471, Riouw; 3 (1852) 57, Singapore; 236, Moluccas; 445, Banka; Verh. Bat. Gen. 24 (1852) 72, Sunda, Moluccas; 26 (1853) 46, Bengal; Verh. Akad. Amsterdam 2 (1855) 10, Diemensland; Nat. Tijdschr. Ned. Ind. 8 (1855) 344, Duizend Island; 15 (1858) 200, Goram Archipelago; 222, Billiton; 16 (1858) 317, Tanara; Act. Soc. Sci. Indo-Neerl. 8 (1860) 30, Sumatra; 2 (1860) 2, Sumatra; 40, Celebes; Nat. Tijdschr. Ned. Ind. 22 (1858) 65, Banka; Versl. Akad. Amsterdam 12 (1861) 74, Pinang; Ned. Tijdschr. Dierk. 1 (1863) 235, Ternate; 2 (1865) 191, Ceram; 290, Amboina; Versl. Akad. Amsterdam (2) 2 (1868) 293, Bintang; Rech. Fauna Madagascar (1875) 99, Madagascar.

Caranx petaurista GEOFFROY, Descript. Egypte (1809) pl. 23, fig. 1.

Caranx poloosoo RICHARDSON, Voy. Erebus and Terror, Ichth. (1844) pl. 58, figs. 4, 5, Australia.

Head 4.25 in total length; depth 3.25; dorsal VII–VIII, 1, 18–20; anal II, 1, 15–16; pectoral 22; ventral 1, 5; caudal 19; eye 4 to 4.5 in head; 1.5 in snout; scutes 13 to 15.

Body oval and strongly compressed; eyes in middle depth of head, without adipose eyelids, but skin extends slightly over edge of eye all around; interorbital space much elevated, having a crest along its middle; jaws of equal length; maxilla reaches to below first third or middle of orbit; greatest depth of preorbital equals one diameter of eye; preopercle, subopercle, and interopercle finely serrated in the young, crenulated or entire in adults; teeth absent from jaws and palate.

Dorsal spines weak, the third highest, 4 in body, interspinous membrane rather deeply emarginate; a recumbent spine anterior to fin very distinct in the young; anterior portion of soft dorsal highest, decreasing to ninth ray, whence it remains the same height; anterior rays 2.33 in depth, upper edge of fin emarginate; pectoral falcate, longer than head, and reaching to beneath eleventh dorsal ray; second free anal spine longest; anal commences on vertical below fifth dorsal ray and is of similar form to soft dorsal.

Body and chest scaled; about one hundred six scales on lateral line; first portion of lateral line to below sixth or eighth dorsal ray forms a long curve, from thence it proceeds direct to center of tail; in first portion of its straight part scutes small, the last thirteen or fifteen pretty well developed and about one-fifteenth the height of body.

Color golden, with vertical black bands alternately narrow and wide, from dorsal to ventral surface, the first wide band descends obliquely through eye; on body are five more wide bands, the first over shoulder touching hind edge of opercle, and the last over the free portion of tail; dorsal fin minutely dotted with fine black points; upper edge of soft dorsal gray, end of caudal lobes black; anal golden. Adults are said to become of a uniform color. (*Day.*)

Not obtained by me.

One specimen from Takao (*Jordan and Richardson*). Bako, Pescadores Islands.

Habitat.—Red Sea, throughout the seas of India to the Malay Archipelago and Australia; Hawaiian Islands.

Genus **ULUA** Jordan and Snyder

Ulua JORDAN and SNYDER, Mem. Carnegie Mus. 4 (1909) 39 (type, *Ulua richardsoni* Jordan and Snyder).

Body rhomboidal, rather deep, compressed; head moderate, slightly deeper than long. Mouth large, oblique; lower jaw projecting prominently beyond upper. Supplemental bone of maxillary developed. Jaws, vomer, palatines, and tongue edentulous. Eye moderate, surrounded by thin adipose eyelid. Gill rakers very long and numerous, projecting upward and forward along sides of mouth and base of tongue, causing the mouth to appear, when opened, as if full of feathers, inner lateral margin ciliated. Lateral line deeply upcurved above pectoral, becoming straight posteriorly, a conspicuous dorsal branch extending upward to occiput, reaching backward to near origin of spinous dorsal. Dorsal spines rather weak, last ones free; soft dorsal and anal strongly falcate, anterior rays elongate. Pectorals elongate, falcate; finlets none.

Geographical distribution.—Southern part of Formosa to the Philippine Islands.

Ulua richardsoni Jordan and Snyder.

Ulua richardsoni JORDAN and SNYDER, Mem. Carnegie Mus. 4 (1909) 39, pl. 53, Takao, Formosa; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 179, Takao.

Caranx plumbeus JORDAN and SEALE, Bull. U. S. Bur. Fisheries 26 (1910) 14, Cavite, P. I.

Head 3.46 in length; depth 2.17; dorsal VII, 1, 21; anal II, 1, 17; pectoral 20; ventral 1, 5; snout 3.43 in head; eye 3.6; interorbital space 3.26; maxillary 2.25; ventrals 2.48; pectoral 2.45 in length; scutes 32.

Body rhomboidal, rather deep, compressed, dorsal profile steep from snout to occiput, then rising more gently to origin of soft dorsal, from tip of lower jaw to origin of anal broadly convex;

head deeper than long, compressed, dorsal median line trenchant; snout slightly longer than eye, conic, obtusely pointed anteriorly; interorbital space strongly convex and high, its edge separated from eye by a distance equal to the latter's diameter; mouth large, oblique, its angle scarcely reaching a vertical through anterior margin of orbit; supplemental bone of maxillary elongate, triangular; lower jaw protruding prominently beyond upper; jaws, vomer, palatines, and tongue edentulous; eye moderate, slightly anterior, on the longitudinal line from tip of snout; adipose eyelid thin, surrounding outer part of eye; nostrils close together, situated midway between tip of snout and eye above; gill openings moderate; gill membranes entirely separated; gill rakers 28 + 58, closely set and extremely long, flat, pointed, inner lateral border finely ciliated, anterior ones projecting upward and forward along sides of mouth and base of tongue, the longest 4.25 in head.

Height of longest dorsal spine 2.75 in head, spines rather weak, last spine stronger and free from the others, folding in a groove; soft dorsal strongly falcate, anterior four rays elevated, the first exceedingly long, tip reaching end of base of fin, rest of rays low; pectoral strongly falcate, extending backward to middle of anal base; ventrals short, inserted below hind part of pectoral base, reaching beyond vent; anal similar to soft dorsal but slightly shorter, anterior part falcate, longest ray reaching beyond anterior two-thirds of anal base; caudal deeply forked, lobes equal, with sharply pointed tip.

Scales very small, those on lower anterior half of body minute and partly embedded; throat and breast entirely naked, unscaled area extending upward to pectoral base beyond; a low sheath of scales along bases of soft dorsal and anal; lateral line strongly upcurved above pectoral, becoming straight below ninth dorsal ray, a conspicuous dorsal branch extending obliquely upward and then extending backward and upward to near origin of spinous dorsal; keeled scutes on straight portion of lateral line, rather weak, strongest on caudal peduncle.

Color in alcohol bluish silvery above, paler and golden below; lower part of head, throat, and breast whitish; dorsals and caudal dusky, basal part of latter yellowish; pectorals and anal yellowish; ventrals white.

Total length, 303 millimeters. Described from a specimen obtained at Tôkô, in April, 1920. Two fine specimens from Tôkô.

Habitat.—Takao (type locality).

Jordan and Snyder [7] have stated that the Philippine carangoid fishes recorded as *Caranx plumbeus* by Jordan and Seale do not differ from the present species.

Remarks.—The above-described example is identical with the cotype from Takao, in having strongly falcated soft dorsal and anal fins. Keeled scutes much more numerous in my specimens than in the type.

Genus **TRACHINOTUS** Lacépède

Trachinotus LACÉPÈDE, Hist. Nat. Poiss. 3 (1798) 79 (type, *Scomber falcatus* Forskål).

Body compressed, more or less elevated, frontal region prominent. Eyes lateral. Snout obtuse and swollen; cleft of mouth small. Teeth on jaws, vomer, and palatines usually lost with age. Two dorsal fins, spinous dorsal with a small connecting membrane, folding into a groove at their base; a recumbent spine directed forward in front of spinous dorsal. Rays of soft dorsal and anal more numerous than the spines in spinous dorsal; anterior portion of soft dorsal and anal pointed and elongate; two preanal spines separated by an interspace from remainder of fin; no finlets. Scales small. Lateral line unarmed. An air bladder bifurcated posteriorly. Pyloric appendages varying in number.

Geographical distribution.—Indian, Pacific, and Atlantic Oceans.

Key to species of Trachinotus Lacépède.

a^1. Height of body not exceeding one-third of total length.
  b^1. Ventrals very small; small black spots on lateral line.... **T. baillonii.**
  b^2. Ventrals moderate; large dark blotches above lateral line.. **T. russellii.**
a^2. Height of body much exceeding one-third of total length. No spots or blotches on or above lateral line.. **T. ovatus.**

Trachinotus baillonii (Lacépède).

Caesiomorus baillonii LACÉPÈDE, Hist. Nat. Poiss. 3 (1798) 93, pl. 3, fig. 1.

Caesiomorus quadripunctatus RÜPPELL, Atlas Fische (1828) 90, pl. 24, fig. 1, Red Sea.

Trachinotus quadripunctatus CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1828) 434; CANTOR, Cat. Malayan Fishes (1849) 122.

Trachinotus baillonii CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1828) 431; GÜNTHER, Cat. Fishes 2 (1860) 484, India, Malay Peninsula, Tanna; DAY, Fishes of Malabar (1865) 98, Malabar; GÜNTHER, Fische der Südsee (1873) 139, Indian Ocean; DAY, Fishes of India (1876) 233, Red Sea, east coast of Africa, seas of India to Malay Archipelago; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 26 (1906) 235, Samoa; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 189, Takao, Formosa; Check-list Philip. Fishes (1910) 21, Zamboanga, P. I.

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[7] Descriptions of three new species of carangoid fishes from Formosa, Mem. Carnegie Mus. 4 (1906–11) 37.

Head 5.33 to 5.5 in total length, caudal 3.33 to 3.5; depth 3 to 3.5; dorsal VI–VII, 1, 22–24; anal II, 1, 22–24; caudal 19; pyloric cæca 12; vertebræ 9, 12; eye 3.5 to 4 in head; snout 1; interorbital space 1.25.

Dorsal spines moderately strong; soft dorsal and anal very much produced in front, and if laid backward the first dorsal ray reaches to nearly the end of that fin, those of anal to its posterior extremity; ventrals small, equaling 1.5 times diameter of orbit; caudal deeply forked, lobes long, upper slightly the longer.

Scales small, placed in sinuous lines; lateral line nearly straight. Upper surface of head and back silvery yellowish green, becoming lighter on sides, and silvery white on abdomen, opercles, and cheeks; lobes of dorsal, anal, and caudal black, some white, likewise those of tail; a row of three to five deep black spots along lateral line. (*Day.*)

Not seen by me.

Habitat.—Red Sea, east coast of Africa, seas of India to the Malay Archipelago, Philippines, and beyond. Jordan and Richardson recorded the present species from Takao and Formosa, and Seno also recorded it from Takao.

Trachinotus russellii (Cuvier and Valenciennes).

Scomber russellii CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1828) 436; DAY, Fishes of India (1876) 233, pl. 51, B, fig. 3, seas of India to Malay Archipelago; JORDAN and SEALE, Bull. U. S. Bur. Fisheries 26 (1906), New Guinea, East Indies; JORDAN and RICHARDSON, Mem. Carnegie Mus. 4 (1909) 180, Takao, Formosa.

Head 5 to 5.75 in total length; caudal 4 to 4.5; depth 3.25; dorsal VI, 1, 22–23; anal II, 1, 20–21; pectoral 17; ventral 1, 5; caudal 17; branchiostegal VII; eye 3.5 to 3.75 in head; snout 1; interorbital space 1.25.

Dorsal and abdominal profiles equally convex; snout obtuse; height of head equals its length; jaws of about equal length; cleft of mouth commences opposite middle or lower third of front edge of orbit, and maxilla reaches to beneath center of eye; preorbital at its widest part equals width of maxilla; central longitudinal crest on head well developed; fine teeth on jaws, vomer, and palatines, even in fishes 22 inches long.

Spines of spinous dorsal of moderate strength; anterior rays of soft dorsal prolonged, equaling two-thirds or three-fourths the length of base of fin and similar to those of anal; pectoral rounded, as long as head without snout, or behind middle of eyes; ventrals as long as postorbital portion of head in the adult, rather longer in the young; they reach above halfway to anal in the young, but are not quite so long in the adult; caudal deeply forked, the central rays equaling one-third of those of the longest outer ones in the young, but one-fourth or even less in the adult.

Scales in regular rows, small; lateral line nearly straight.

Colors greenish, dashed with yellow on back, becoming more golden on sides and beneath; usually a dark blotch at upper margin of opercle and commencement of lateral line; from three to five large, dull, rounded blotches a little distance above lateral line, but these often disappear after death; they are much darker and more persistent in the adult than in the young; elongated portion of dorsal and anal fins and lobes of caudal orange stained with black. (*Day.*)

Not obtained by me.

Habitat.—Distributed from seas of India to the Malay Archipelago. A single specimen from Takao (*Jordan and Richardson*).

Remarks.—This species can be at once distinguished from *T. baillonii* by the spots being above, not on, the lateral line, and by its much longer ventral fins. (*Day.*)

Trachinotus ovatus (Linnæus).

Gasterosteus ovatus LINNÆUS, Syst. Nat. 1 (1758) 490.

Centronotus ovalis LACÉPÈDE, Hist. Nat. Poiss. 3 (1798) 309, 316.

Scomber falcatus FORSKÅL, Descr. Anim. (1775) 57.

Caesiomorus blochii LACÉPÈDE, Hist. Nat. Poiss. 3 (1798) 95, pl. 3, fig. 2.

Trachinotus falcatus LACÉPÈDE, Hist. Nat. Poiss. 3 (1798) 79; RÜPPELL, Atlas Fische (1828) 89; CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1828) 430.

Trachinotus mookalee CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1828) 423; CANTOR, Cat. Malayan Fishes (1849) 120; BLEEKER, Verh. Bat. Gen. 24 (1853) 48.

Trachinotus blochii CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1828) 425.

Trachinotus affinis CUVIER and VALENCIENNES, Hist. Nat. Poiss. 8 (1828) 428.

Trachinotus falciger CUVIER and VALENCIENNES, Hist. Nat. Poiss. **8** (1828) 428.

Trachinotus drepanis CUVIER and VALENCIENNES, Hist. Nat. Poiss. **8** (1828) 429.

Trachinotus auratus RICHARDSON, Ichth. China (1846) 270, China.

Trachinotus ovatus GÜNTHER, Cat. Fishes **2** (1860) 481, Malay Peninsula, Red Sea, Amboina, Moluccas, Pinang, China, Australia (in part, not of Linnæus); KNER, Novara, Fische (1865) 164, Java; DAY, Fishes of Malabar 1865) 97, Malabar; GÜNTHER, Fische der Südsee (1873) 139, Indian Ocean; DAY, Fishes of India (1896) 234, pl. 51, B, fig. 2, Indian Ocean; FOWLER, Journ. Acad. Nat. Sci. Phila. **12** (1904) 513, Sumatra; JORDAN and SEALE, Bull. U. S. Bur. Fisheries **26** (1906) 235, Samoa; JORDAN and RICHARDSON, Mem. Carnegie Mus. **4** (1909) 180, Takao, Formosa; JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci. Tokyo **33** (1913) 131, Japan.

Japanese name: *Koban-aji.*

Head 3.75 in length; depth 1.7; dorsal VI, 1, 19; anal II, 1, 17; pectoral 20; ventral 5; snout 3.4; eye 4.1; interorbital space 2.04; pectoral 1.22; ventral 2.25.

Body broadly ovate, strongly compressed, dorsal and ventral profiles equally arched, the former very evenly convex from origin of spinous dorsal to level of upper edge of eye, where it descends almost vertically, vertical portion is about $1\frac{1}{3}$ times eye, snout very slightly longer than eye; mouth rather small, low, and very slightly oblique, upper jaw protractile, a little longer than lower; no supplemental bone of maxillary; maxillary scarcely reaching a vertical through anterior border of orbit; jaws, tongue, vomer, and palatines edentulous; eye rather small, strongly anterior, surrounded by thin adipose eyelid; interorbital space high, strongly convex, with median ridge which extends backward to the recumbent spine; nostrils large, oval, close together, in front of eye above; gill openings moderate, membranes united anteriorly; gill rakers 4 + 8, roughly set, rather short and pointed, those on lower part of lower limb rudimentary.

Dorsal spines short and thick, basal part connected by membrane folded in a groove; recumbent spine before origin of spinous dorsal, entirely hidden beneath skin; soft dorsal elongate, falcate, anterior rays reaching middle of base, first ray the longest, 1.12 in head; pectoral short, not falcate, scarcely reaching vent above; ventrals slender, reaching midway to origin of first preanal spine; anal similar to soft dorsal, anterior rays elevated, longest 1.19 in head; caudal deeply forked, lobes elongate, tip sharply pointed.

Scales minute, not deciduous; lateral line weakly upcurved above pectoral, slightly undulating, posterior part from tenth dorsal ray beneath to base of caudal straight, running along middle of tail, scutes none.

Color in alcohol bluish silvery above, paler and silvery below; lower part of head whitish; pectorals dusky, tinged with yellow; soft dorsal and anal yellowish, outer margin of elevated part of former blackish; ventrals white; caudal yellowish gray, outer margin darker.

Total length, 302 millimeters. Described from a specimen purchased at the Taihoku fish market on December 21, 1918, locality unknown.

Habitat.—Jordan and Richardson recorded the present species from Takao. Distributed from the Indian Ocean, Malaysia as far as the coasts of Australia, to the southern part of Japan.

Remarks.—*Trachinotus falcatus,* which is confounded with the present species by several writers, differs distinctly from *ovatus* in having much more falcated soft dorsal and anal fins, the anterior rays of which reach almost to the posterior end of the fins.

SUMMARY

CARANGIDÆ

Genus **SCOMBEROIDES** Lacépède

1. **formosanus** sp. nov.; Keelung; Tôkô.
2. **tol** (Cuvier and Valenciennes); Takao.
3. **sancti-petri** (Cuvier and Valenciennes); Tôkô; Tainan.

Genus **SERIOLA** Cuvier

4. **purpurascens** Temminck and Schlegel; Keelung; Takao; Pescadores Islands.

Genus **ELAGATIS** Bennett

5. **bipinnulatus** (Quoy and Gaimard); Taihoku.

Genus **DECAPTERUS** Bleeker

6. **muroadsi** (Temminck and Schlegel); Formosa (locality unknown).
7. **kurra** (Cuvier and Valenciennes); Taihoku, probably from Keelung; Bako, Pescadores Islands.
8. **kurroides** Bleeker; Tôkô.
9. **maruadsi** (Temminck and Schlegel); Taihoku.
10. **macrosomus** (Bleeker); Formosa (locality unknown).

Genus **MEGALASPIS** Bleeker

11. **cordyla** (Linnæus); Tôkô; Tainan; Takao.

Genus **TRACHURUS** Rafinesque

12. **trachurus** (Linnæus); Taihoku.

Genus **TRACHUROPS** Gill

13. **crumenophthalmus** (Bloch); Takao; Giran; Tainan; Bako, Pescadores Islands.

Genus **CARANX** (Lacépède) Bleeker

14. **jarra** Cuvier and Valenciennes; Keelung.
15. **formosanus** Jordan and Snyder; Takao.
16. **hippos** (Linnæus); Tainan; Keelung.
17. **cynodon** Bleeker; locality unknown.
18. **forsteri** (Cuvier and Valenciennes); Keelung; Tôkô; Tainan; Giran.

Genus **SELAR** Bleeker

19. **djeddaba** (Forskål); Tainan; Taihoku (locality unknown).
20. **affinis** (Rüppell); Takao.
21. **sexfasciatus** (Quoy and Gaimard); Takao.
22. **ignobilis** (Forskål); Takao.

Genus **ALEPES** Swainson

23. **helvolus** (Forster); Tôkô.

Genus **LEPTASPIS** Bleeker

24. **leptolepis** (Cuvier and Valenciennes); Keelung.

Genus **CARANGOIDES** Bleeker

25. **hemigymnostethus** Bleeker; Taihoku (locality unknown).
26. **malabaricus** (Bloch and Schneider); Anpin; Keelung; Takao; Bako, Pescadores Islands.
27. **equula** (Temminck and Schlegel); Taihoku (locality unknown).

Genus **CITULA** Cuvier

28. **rastrosus** (Jordan and Snyder); Takao; Tôkô.
29. **pescadorensis** sp. nov.; Pescadores Islands.
30. **armata** (Forskål); Anpin; Taihoku (locality unknown).

Genus **ALECTIS** Rafinesque

31. **gallus** (Linnæus); Taihoku (locality unknown).
32. **major** (Cuvier and Valenciennes); Takao.
33. **ciliaris** (Bloch); Pescadores Islands; Taihoku (locality unknown).

Genus **GNATHANODON** Bleeker

34. **speciosus** (Forskål); Takao; Bako, Pescadores Islands.

Genus **ULUA** Jordan and Snyder

35. **richardsoni** Jordan and Snyder; Takao; Tôkô.

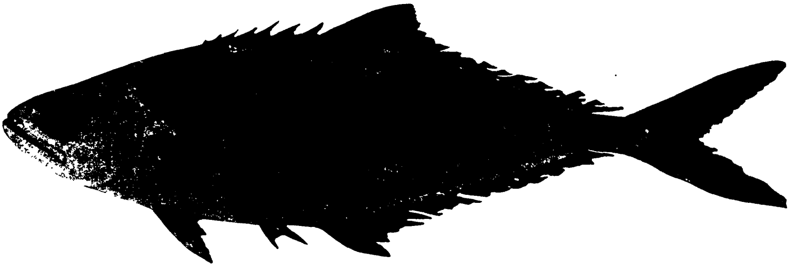
Genus **TRACHINOTUS** Lacépède

36. **baillonii** (Lacépède); Takao.
37. **russellii** (Cuvier and Valenciennes); Takao.
38. **ovatus** (Linnæus); Takao; Taihoku (locality unknown).

ILLUSTRAITON

PLATE 1

FIG. 1. *Scomberoides formosanus* sp. nov.
2. *Citula pescadorensis* sp. nov.



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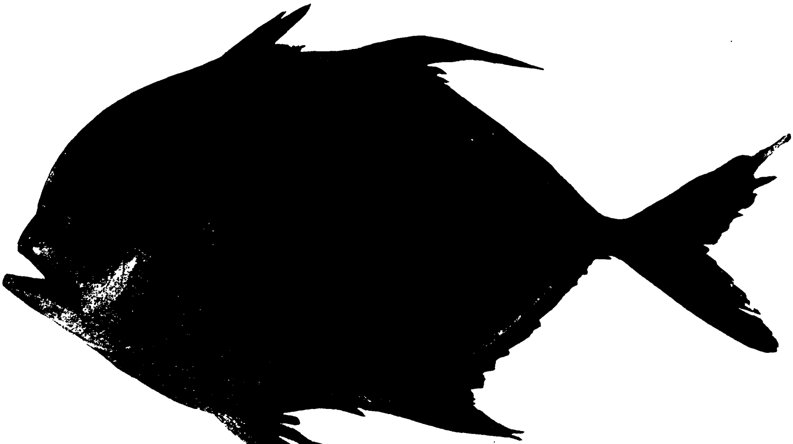

2

PLATE 1.

UNIV. OF MICH.

NEW THYNNID WASPS FROM THE ORIENTAL AND AUSTRALIAN REGIONS

By S. A ROHWER

Of the Bureau of Entomology, Washington, D. C.

ONE PLATE

The new species described below were nearly all received from Prof. C. F. Baker for identification. The types of all of the new forms are in the collections of the United States National Museum. The new species of *Thynnus* from Luzon is the second thynnid recorded from the Philippine Islands and is interesting in that it indicates that this family may be better represented in the Oriental Region than had been previously supposed.

Ariphron bicolor var. **propodealis** var. nov.

Male.—Length, 11.5 millimeters. Agrees with Turner's description of *A. rigidulus,* which has been considered as the male of *bicolor,*[1] in all ways except in having the propodeum rufo-ferruginous and concolorous with the basal abdominal segments.

Type locality.—Ebor, New South Wales.

One male collected at an altitude of about 1,650 meters (5,000 feet) by H. Petersen and forwarded by C. F. Baker under his No. 20419.

Type.—Catalogue No. 26485, United States National Museum.

Lophocheilus ruficeps sp. nov. Plate 1, fig. 1.

In structure and outline this species is very much like *Lophocheilus obscurus* (Klug), but it differs in details of sculpture and in color. In color and general habitus it seems to be similar to *Lestricothynnus* (?) *vigilans* (Smith), but differs from the description of the female in not having the first tergite coarsely punctured and in having seven carinæ on the second tergite.

Female.—Length, 9.5 millimeters. Anterior margin of the clypeus truncate, without a median longitudinal carina; frontal impressed line deep ventrally, becoming obscure dorsally; head distinctly wider than long; the dorsal angles rounded, smooth, but with a few widely scattered, distinct punctures; scape polished; flagellum granular and opaque, first two joints subequal; pronotum slightly narrower than the head, slightly narrowing posteriorly, shining, but with large, scattered punctures medianly, laterally with punctures smaller and closer; scutum shining but with sparse, large punctures; propodeum with large punctures dorsally, and small, close reticulations posteriorly; dorsal and anterior surfaces of first tergite separated by an indistinct, irregular carina, the anterior face with small, close punctures, the dorsal surface shining and with a distinct preapical groove; second tergite with seven (including the apical, upturned ridge) transverse carinæ; third tergite with a transverse, impressed line, the anterior part finely granular, the posterior part shining and with widely separated punctures; the fourth and base of fifth tergites shining but with sparse, scattered punctures; the sides of fifth tergite granular and with fine aciculations and a few widely scattered, large punctures; pygidium oblique, slightly notched before apex, strongly convexed medianly and with irregular longitudinal striæ; apical sternite coarsely and irregularly striate, the margin with a deep, U-shaped emargination; the third and fourth sternites with irregular punctures. Black; antennæ and legs below coxæ rufoferruginous; hair white, erect, and sparse.

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[1] Ann. & Mag. Nat. Hist. VIII 15 (1915) 541.

Type locality.—Illawarra, New South Wales.

Described from a single female, collected by H. Petersen, and sent by C. F. Baker, under his No. 20423.

Type.—Catalogue No. 26484, United States National Museum.

Zaspilothynnus cyaneiventris sp. nov. Plate 1, figs. 2 and 3.

Female.—Length, 12.5 millimeters. In habitus and superficial appearance this species seems to be very close to *Z. excavatus* Turner and certainly belongs to this species group.

Anterior margin of clypeus truncate; frontal prominence with a distinct, though rather feeble, median furrow; head (seen from in front) with the upper angles rounded, one and one-third times as broad as high, polished but with a few widely scattered, setigerous punctures; scape compressed, broader apically; third antennal joint slightly longer than fourth; pronotum polished, slightly narrowing posteriorly, twice as broad as long, anterior margin sharply truncate but without a carina; along anterior margin of pronotum there are about eight deep, setigerous punctures, the hairs arising from these punctures long and erect; thorax polished; margins of scutellum with a row of setigerous punctures; propodeum truncate, with the dorsal angle rounded, broader below; first tergite shining, oblique anteriorly, with a series of setigerous punctures at dorsal margin; dorsal surface of first tergite with five transverse striæ before the elevated apical margin, the area before apical margin finely granular; second tergite with seven striæ, apical margin prominent and preceded by a few transverse aciculations; the third and following tergites polished but with a few scattered punctures; a circular area at sides of fifth tergite with close, almost confluent punctures; apical sternite with a deep, U-shaped emargination; pygidium slightly longer than its greatest width, the basal third rugulose, remaining area smooth. Black; base of mandibles, clypeus, frontal prominence, an obscure line to inner margin of eyes, four spots on pronotum, a spot on scutellum, and four anterior tibiæ obscurely yellowish; the hairs stiff and white.

Male.—Length, 19.5 millimeters. Clypeus strongly convex, with convex area triangular in outline and almost keeled dorsally, the anterior margin broadly truncate, the surface with rather large, sometimes confluent punctures; the frontal prominence gently curved; a well-defined stria reaching almost to anterior ocellus; front striate-punctate; vertex and orbits with separate, small punctures; third antennal joint one-fourth shorter than fourth; apical fifth joints of antenna slightly curved dorsally; anterior margin of pronotum with a distinct transverse carina, the surface finely granular; scutum finely punctured, the impressed lines strong, the median area with the punctures larger and more widely separated; scutellum with close punctures, gently convex and with a smooth median line; metanotum polished but with a few scattered, setigerous punctures; propodeum reticulate but in some lights appearing transversely aciculate; mesepisternum obscurely laminate; sides of propodeum with small, irregular, setigerous punctures; abdomen smooth and shining; seventh tergite coarsely coriaceous; hypopygium broader at base than long; third and fourth abscissæ of cubitus subequal and slightly shorter than second inner cubitus. Black; mandibles, except apices, anterior and lateral margins of clypeus, a wedge-shaped median spot on clypeus, inner orbits (very narrow above), transverse frontal prominence, the posterior orbits, anterior margin of pronotum narrowly and interrupted medianly, and the four anterior tibiæ yellowish; basal third of posterior tibia fulvo-piceous; wings hyaline with an obscure yellowish tinge, the radial cell dark brown; venation brown, except the cubitus and veins which join it, which are pale brown; head and thorax with rather long, yellowish hair, which is darker and shorter than on dorsum; tergites with a distinct violaceous reflection.

Type locality.—New Guinea.

Described from a single male and female, mounted on the same pin, and received from B. P. Clark.

Type.—Catalogue No. 26482, United States National Museum.

Thynnus bakeri sp. nov. Plate 1, figs. 4 and 5.

Female.—Length, 10 millimeters. Because of the dense, gray hair on the first tergite, the appearance of this species is very characteristic. Head seen from in front broader above, wider than high; frons shining and deeply concave laterally to a short distance above level of eyes; median prominence strong, sharply carinate laterally, with deep setigerous punctures and a strong median carina which reaches more than halfway to vertex; vertex immediately above the concave area on frons with distinct, rather large, setigerous punctures; the rest of vertex polished and impunctate; scape polished with a few long, silvery hairs on ventral margin; pronotum slightly narrowing posteriorly, its median length three-fifths its posterior width, anterior margin with a strong carina and undulate but not dentate laterally; surface of pronotum finely aciculate and with irregular, shallow depressions, medianly with a broad, low, longitudinal ridge; mesonotum with setigerous punctures; propodeum shining, without strong sculpture; first tergite with a single carina before apex, dorsal surface with dense, setigerous punctures; second tergite with eight strong, transverse carinæ; the third and following tergites shining but when highly magnified finely reticulate and with scattered, distinct, setigerous punctures; apical margin of fifth tergite coarsely granular; epipygium subopaque without distinct punctures; the contracted basal portion of pygidium with strong, transverse ridges; the broader apical portion of pygidium polished with two (on each side) lateral teeth, and with obtusely rounded projection apically; fifth sternite with strong, longitudinal carinæ, apical margin with deep, U-shaped, median emargination. Black; the sides of first, second, third, and sixth tergites with lateral spots, those on third very elongate and almost meeting medianly; pubescence glistening white except on first tergite where it is gray.

The paratype female is larger (12 millimeters) and differs in having the spot on third tergite much smaller, though still larger than those on the other tergites.

Male.—Length, 17 millimeters. The male can be readily distinguished from *Thynnus luzonicus* Turner by the general black color.

Anterior margin of clypeus broadly truncate, surface strongly convex, the convex portion acute dorsally, longitudinally rugose on a granular surface; the inner antennal area prominent, shining, and with a median, longitudinal furrow which almost reaches anterior ocellus; sides of frons with small punctures which are sometimes confluent; vertex shining but with well-separated, distinct punctures, convex between the lateral ocelli; antenna shorter than head and thorax; pronotum with a strong carina on anterior margin which is followed by a deep sulcus; surface of pronotum, mesonotum, and scutellum shining with small, well-separated punctures; posterior margin of scutellum broadly rounded and with a slight, median tubercle; mesonotum and propodeum subopaque with close, sometimes confluent punctures; posterior face of propodeum with a median furrow; anterior margin of first tergite sharply truncate; tergites shining with distinct, rather close punctures; basal area of seventh tergite with longitudinal ridges; sixth sternite with lateral spines well developed; the basal spines of hypopygium broad, hook-shaped, the median spine triangular; the dorsal surface of hypopygium with oblique ridges; sternites with distinct, well-separated punctures. Black; lateral margin of clypeus, inner margin of eyes almost to vertex, an obscure spot on base of mandibles, and the superior posterior orbits narrowly, yellowish, surface of clypeus with a piceous spot; head and thorax rather well clothed with long white hair; wings strongly smoky and in certain lines with a purple reflection.

The paratype male differs in having the clypeus and inner orbits almost entirely black and in having the yellow line on the superior posterior orbit extended across the vertex to a point behind the lateral ocelli.

Thynnus luzonicus Turner. Plate 1, fig. 6.

Thynnus luzonicus TURNER, Trans. Ent. Soc. London (1908) 65.

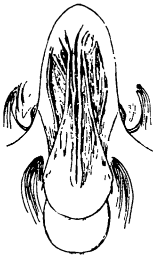
A single male from Polillo Island (off the eastern coast of Luzon), received from C. F. Baker, agrees well with the description of Turner's species. The following color markings are the only differences between the description and the male before me: In my specimen the spots on the third and fourth sternites are very small and those on the fifth sternite are wanting; the hind femora are almost entirely black; and there is a small yellow spot on the metapleuron beneath the hind wing.

Female.—A female from the same locality (*Baker 18884*) is almost certainly the female of this species. This female is closely allied to *Thynnus bakeri* but differs as follows: Median frontal prominence more sparsely punctured and with a median sulcus instead of a carina; pygidium distinctly longer than wide, opaque, with two median longitudinal ridges which reach beyond the middle; tergites 1 to 6 inclusive with lateral spots, those on the third elongate and almost meeting. Length, 11.5 millimeters.

ILLUSTRATION

PLATE 1

FIG. 1. *Lophocheilus ruficeps* sp. nov. Pygidium. Type female.
2. *Zaspilothynnus cyaneiventris* sp. nov. Pygidium. Type female.
3. *Zaspilothynnus cyaneiventris* sp. nov. Hypopygium. Type male.
4. *Thynnus bakeri* sp. nov. Pygidium. Paratype female.
5. *Thynnus bakeri* sp. nov. Hypopygium. Paratype male.
6. *Thynnus luzonicus* Turner. Pygidium.



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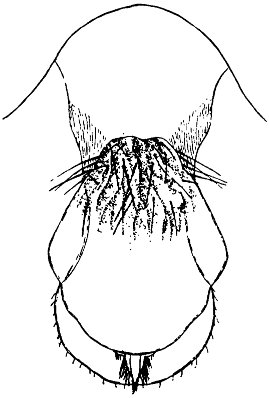

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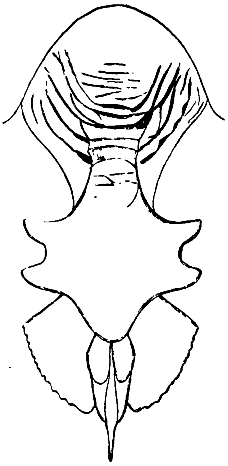

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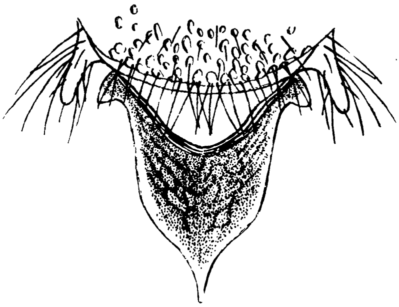

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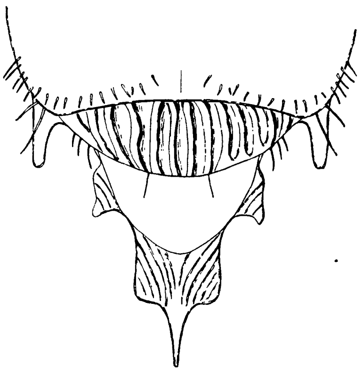

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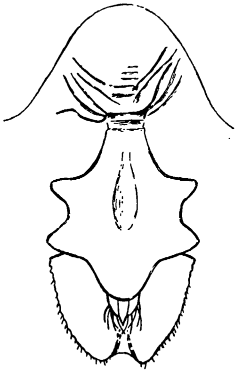

6

PLATE I.

UNIV. OF MICH.

DIE TENEBRIONIDEN (COLEOPTERA) DES INDO-MALAYISCHEN GEBIETES, UNTER BERUECKSICHTIGUNG DER BENACHBARTEN FAUNEN, II

DIE GATTUNGEN ATASTHALUS, BOLITOXENUS, BOLITONAEUS, UND SUMBAWIA

Von HANS GEBIEN

Hamburg, Germany

ZWEI TAFELN

Genus **ATASTHALUS** Pascoe

Atasthalus PASCOE, Ann. & Mag. Nat. Hist. IV 8 (1871) 348; LEWIS, Ann. & Mag. Nat. Hist. VI 13 (1894) 385.

Diese Gattung ist von *Byrsax* nicht nur habituell weit geschieden, sondern auch durch die ganz andern Fühler, bei denen das letzte Glied in das vorletzte eingelassen ist. Lewis hat den Umfang der Gattung verkannt, indem er drei Arten hineinstellt die zu *Bolitoxenus* gehören. Näheres darüber wird bei dieser Gattung auseinandergesetzt. Wollen wir wirklich eine Trennung dieser und der nächstverwandten Gattungen durchführen, so müssen wir uns eines Merkmales bedienen, von dem keiner der Autoren bisher eine Erwähnung macht. Das ist die Gestalt des Pronotums, welches bei *Atasthalus* am Grunde ungehäutet ist und dort senkrecht abfällt, bei *Bolitoxenus* dagegen sind die Seiten bis zu den Hinterecken verflacht abgesetzt.

Von den in meinem Catalog[1] aufgeführten Arten gehört also nur *Atasthalus spectrum* in die Gattung, der Typus; später[2] habe ich *Atasthalus miles* beschrieben. Eine neue Art kommt hier hinzu. Die drei Arten lassen sich wie folgt unterscheiden:

Tabelle zur Bestimmung der Atasthalus-Arten.

1. Schenkel unten mit Doppelkiel, Halsschild schwach quer, Männchen am Epistom mit einem konischen Horn .... **A. rhinoceros sp. nov.**
Schenkel unten ungekielt, Halsschild stark quer, Männchen mit anderer Kopfbildung .... 2.

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[1] Col. Cat. (1910–1911) 360.

[2] Saraw. Mus. Journ. 2 (1914) 2.

2. Kopf beim Männchen mit zwei Hörnern, Hörner des Halsschildes vom Grunde an auseinander tretend, mit der Spitze gegeneinander geneigt, oder mit zwei starken runden Schwielen; Weibchen, die Protuberanzen des Pronotums liegen getrennt.. A. spectrum Pascoe.
Kopf mit einem Horn, das an der Spitze verbreitert ist, die Hörner des Pronotums auf lange Strecke miteinander verwachsen, vorn auseinander tretend; Weibchen, die Höcker des Halsschildes liegen zusammen .... A. miles Gebien.

Atasthalus spectrum Pascoe. Tafel 2, Fig. 1, 2.

Atasthalus spectrum PASCOE, Ann. & Mag. Nat. Hist. IV 8 (1871) 348, t. 14, f. 3; GEBIEN, Saraw. Mus. Journ. 2 (1914) 2, t. 1, f. 3.

Diese Art, eine der ausgezeichnetsten unter den Tenebrioniden, ist an der Hornbildung des wohlentwickelten Männchens leicht kenntlich und mit keiner andern zu verwechseln.

Höchst eigentümlich ist das Auftreten eines Dimorphismus beim Männchen; ich mag diese Form nicht als Varietät auffassen. Erstens, die von Pascoe beschriebene Form its sofort kenntlich an den Hörnern des Pronotums, die am Ende spitz und mit der Spitze nach innen gerichtet sind. Von dieser Form finden sich Männchen in allen Entwicklungstadien, von solchen mit starken, sehr langen Kopfhörnern, die hinten im Enddrittel ein Zähnchen tragen, bis zu solchen bei welchen die Hörner auf zwei mehr oder minder scharfe Spitzen beschränkt sind. Zweitens, daneben kommt eine Form des Männchens vor, bei welcher die Prothoracalhörner runde, stark erhabene Beulen sind, welche divergieren; auch diese Form ist oft ausgezeichnet entwickelt und hat gezähnte Hörner auf dem Kopf, bis sich auch hier eine Reduktion zeigt, so dass nur Zwei Spitzen auf dem Kopf vorhanden sind. Uebergänge zwischen beiden Formen habe ich nicht gefunden; wenn auch die Hörner des Halsschildes bei mangelhaft entwickelten Männchen immer kleiner werden, so zeigt sich bei der ersten Form noch immer eine Spitze, bei der zweiten Form, die ich subsp. *callosus* nennen möchte, die runden Höcker. Uebrigens ist *callosus* nicht örtlich beschränkt, sondern findet sich wie es scheint überall mit der Stammform; wenigstens liegt sie mir vor von Tebing-tinggi, Palembang, Liangagas, Soekaranda, in beiden Formen.

Die Weibchen scheinen wesentlich seltener zu sein, bei ihnen sind keine Formen zu unterscheiden.

Malacca. Sumatra, Liangagas (*Dohrn*); Soekaranda, Januar, 1894 (*Dorhn*); Tandjong Morawa, Serdang (*Dr. B. Hagen*); Palembang; Tebing-tinggi, Januar 25 bis 27, 1885;

Februar 7 bis 17, 1885 (*Dr. Schultheiss*); Deli, Ober Langkat (*W. Reinick*). Java Occidental, Toegoe (*J. D. Pasteur*). Borneo, Kuching (Sarawak) November 9 bis Dezember 14, 1898 (*Moulton*).

Zweiundvierzig Exemplare in den Sammlungen Leyden, Stettin, Berlin, Dahlem, Sarawak, und Gebien.

Atasthalus miles Gebien.

Atasthalus miles GEBIEN, Saraw. Mus. Journ. 2 (1914) 2, t. 1., f. 1, 2.

Diese Art ist an den langen, zusammengewachsenen Hörnern des Pronotums und dem Gabelhorn auf dem Clypeus leicht zu erkennen. Mir liegt jetzt ein Männchen vor, bei welchem die Prothoracalhörner nur leicht einzeln verrundet sind; dieses Tier zeigt die Bewaffnung des Halsschildes schwächer als manches Weibchen; es ist nür an dem Horn auf dem Clypeus als Männchen zu erkennen, das aber ebenfalls sehr kurz und an der Spitze nur leicht geteilt ist.

Sumatra, Palembang, Soekaranda, Januar, 1894 (*Dohrn*); Liangagas (*Dorhn*). Borneo, Matang Reed, September 17, 1910 (*Moulton*); Kuching, October 19, 1898 (*Moulton*). In den Sammlungen Dahlem, Stettin, Sarawak, und Gebien (Typen!)

Atasthalus rhinoceros sp. nov. Tafel 1, Fig. 1, ♂.

Schwarz, mässig schlank, der ganze Körper in die Reste des Wirtspilzes eingehüllt, so dass die Skulptur nur nach sorgfältiger Reinigung erkannt werden kann.

Kopf flach ausgehöhlt, auf der Stirn befinden sich zwei runde Tuberkeln ziemlich weit auseinander, vor denen eine gebogene, mässig tiefe Querfurche verläuft, vor dieser wieder, aber weiter zusammengerückt, stehen zwei leichte runde Erhabenheiten. Die Augen werden innen durch eine ziemlich spitze Tuberkel eingeengt. Die Wangen sind unmittelbar vor den Augen grubig vertieft und davor kräftig aufgeworfen. Der Clypeusrand ist gerade, ohne Zähnchen; auf dem Epistom erhebt sich ein gerades, sich schnell verjüngendes, spitzes Horn, das vorn seicht und dicht punktiert ist. Die Wangen sind breiter als die Augen, aber treten nicht winklig vor. Die Fühler sind schlank, Glied 3 ist doppelt so lang wie dick, 4 so dick wie lang, 5 schwach quer mit deutlicher Innenecke, die folgenden werden immer stärker quer, 10 ist an der Spitze tief ausgeschnitten und nimmt das viel kleinere elfte auf, beide zusammen scheinen bei flüchtiger Betrachtung ein Glied zu bilden.

Der Halsschild ist schwach quer, die Seiten sind in der Vorderhälfte verflacht und der Rand ist dort mit drei oder vier groben Zähnen versehen, von denen der vorderste die spitz vorragende Vorderecke bildet, in der Endhälfte felht eine Randkante, von oben gesehen erscheinen aber die Hinterecken scharf rechtwinklig. Von der Mitte der Scheibe ragt jederseits ein starkes, sich schnell verjüngendes Horn nach vorn, das leicht nach innen gebogen ist, nicht sehr spitz, die beiden Hörner sind im Bogen voneinander getrennt, die Körnelung ist sehr rauh, die Spitze unbehaart. Hinten findet sich jederseits der Mitte eine Reihe von Körnern, ferner ist die Scheibe auf jeder Seite durch Fältelung und Körnelung rauh, eine Punktierung fehlt.

Die Flügeldecken sind parallelseitig, hoch gewölbt, mit Reihen grober Punkte versehen, die nur durch die stärkeren Höcker etwas verdrängt wird. Jeder Zwischenraum mit einer Reihe von Körnern, doch können drei Hauptreihen unterschieden werden, von denen die innerste die grössten, höckerähnlichen Tuberkeln hat. Die kleinsten Körner stehen sehr weitläufig, zuweilen nur zwei oder drei in einer Reihe, die Randreihe ist von oben sichtbar und hat dichter stehende Körner, die Schulterschwiele ist stark entwickelt.

Das Prosternum ist vorn nicht gesenkt, aber hinten gerundet heruntergedrückt, hat aber dort, oben am Absturz, eine winzige Tuberkel, eine ebensolche, aber weiter oben stehende findet sich vorn am Mesosternum. Das Metasternum ist vorn dick gerandet, in der Mitte mit lochartigem Grübchen versehen, das erste und letzte Abdominalsegment sind punktiert, die beiden vorletzten sind hinten scharfkantig senkrecht abfallend wie bei den andern beiden Arten. Die Beine sind mässig lang, die Schenkel unten doppelt gekielt, die Schienen nicht nur hinten, sondern auch an der Aussenseite gekielt, die Tarsen sind sehr dünn.

Länge, 9 Millimeter (ohne Hörner) ; Breite, 4.5.

Ein Männchen von Tonkin, Laos, das ich von Staudinger und Bang-Haas erwarb, in meiner Sammlung.

Diese ausgezeichnete Art ist von den andern beiden weit getrennt durch die Bildung von Kopf und Halsschild beim Männchen. Sie hat wie *Astasthalus miles* auf dem Kopf ein Horn, das aber am Ende nicht flach und geteilt, sondern spitz ist. Die beiden Hörner des Pronotums sind ähnlich wie bei *A. spectrum,* aber gerade, ferner hat die letztere Art zwei Hörner auf dem Kopf. Von beiden Arten ist unsere durch den Kopf und die unten doppelt gekielten Schenkel unterschieden.

Genus BOLITOXENUS Motschulsky

Bolitoxenus MOTSCHULSKY, Etudes Entom. 3 (1858) 64.

Diese Gattung, ungenügend beschrieben, scheint allgemein verkannt worden zu sein; sie enthält daher bis heute die eine Art, den Typus der Gattung, *Bolitoxenus gibber,* die mir erst jetzt vorliegt. Nach ihrer Untersuchung muss ich feststellen, dass in unsere Gattung eine ganze Anzahl von Arten eingereiht werden müssen, die bei *Bolitonaeus* und *Atasthalus* untergebracht waren. Pascoe stellt allerdings seine Art *bifurcus* richtig in die Gattung *Bolitoxenus* von Motschulsky, aber Lewis verbessert das und zieht sie in seine neue Gattung *Bolitonaeus.* Als Hauptkriterium galt bei den verwandten Gattungen die Bildung der Fühler, bei denen das elfte Glied dem zehnten aufsitzt, ein Merkmal das allen drei Gattungen zukommt, nicht nur einer. Eine Neubeschreibung ist also notwendig, weil einmal die Originalbeschreibung sehr dürftig ist; zweitens, in einer schwer zugänglichen Zeitschrift erschienen; und drittens, nur für eine Art gilt. Motschulsky's Beschreibung lautet:

> J'ai séparé cette espéces de *Boletophagus* à cause de ses antennes tout autrement construites que chez les *Boletophagus*, présentant vers l'extrémité, des articles fortement transversaux, dont le dernier est brusquement tronqué; le $3^{ième}$ est à peine plus long que le $2^{ième}$.

Beschreibung der Gattung.—Geflügelt, durch grobe Skulptur sehr rauh, Körper kurz. Kopf flach, beim Männchen ungehörnt (Ausnahme, *B. spathifer*), der Rand des Clypeus aufgeworfen, scharfkantig oder mit zwei Spitzen. Die Augen sind nicht geteilt, die Wangen vor ihnen gut entwickelt, winklig abgesetzt. Die Fühler haben elf Glieder, Glied 3 ist kurz, meist wenig länger als 4, die letzten fünf, sechs, oder sieben Glieder bilden eine starkgesägte Keule, 10 ist stark quer, oben ausgeschnitten, und bildet mit dem kleinen elften zusammen scheinbar ein Glied. Die Mundteile liegen erhöht. Zwischen ihrem Aussenrand und den Augen befindet sich eine hohe Kante und darunter eine tiefe Fühlerfurche neben den Augen. Das Kinn ist flach, das Endglied aller Palpen zylindrisch, die Mandibeln sind am Ende ausgeschnitten, der Mahlzahn ist gross, höchst fein quergerieft.

Der Halsschild ist beim Weibchen mit Buckel versehen, beim Männchen entweder ebenfalls mit zwei knolligen mittleren Erhabenheiten oder mit zwei langen, an der Spitze mit Haarschopf versehenen Hörnern. Die Seiten sind bis zu den Hinterecken gekantet und breit verflacht, die Kante ist gesägt oder gekerbt.

Flügeldecken mit starken Schultern und gereihten Erhabenheiten oder Körnern, Rand von oben sichtbar, ebenfalls gesägt oder gekerbt, Epipleuren vollständig.

Das Prosternum ist der Länge nach gekielt (Ausnahmen, *B. dentifrons* und *B. spathifer*), mit scharfer Endecke. Auch das gekielte Mesosternum hat vorn eine scharfe Ecke. Hinterbrust lang. Schenkel mit scharfem Doppelkiel an der Unterseite, welcher die ganze Länge einnimmt. Die Schienen mit drei Kielen, von denen einer an der Hinterseite liegt. Tarsen dünn.

Typus der Gattung ist *Bolitoxenus gibber* Motschulsky.

In diese Gattung gehören ferner: *Atasthalus serratus* Gebien, *A. bellicosus* Lewis, *A. taprobanae* Lewis, *A. dentifrons* Lewis, *Bolitonaeus spectabilis* Gebien, *B. capricornis* Gebien, und *Eledona* (*Bolitonaeus*) *bifurca* Pascoe.

Tabelle zur Bestimmung der Bolitoxenus-Arten.

1. Männchen mit langem, am Ende schaufelförmigem Horn auf dem Kopf, Prosternum nicht deutlich gekielt, nicht wagerecht. (Borneo.) **B. spathifer** sp. nov.

Männchen ohne Kopfhörner, Prosternum wagerecht, wenigstens zum Teil, und gekielt (Ausnahme, *B. dentifrons*) .... 2.

2. Flügeldecken mit einfachen Reihen tiefer Punkte .... 3.

Flügeldecken mit Knotenstreifen (das heisst, Körnchen) zwischen den Punkten der Reihen .... 10.

3. Halsschildseiten eingezogen, im Basalteil parallel, dort nicht verflacht, Prosternum ungekielt, hinten niedergebogen, Schienen zur Spitze nicht verjüngt. (Japan.) .... **B. dentifrons** (**Lewis**).

Halsschild gleichmässig gebogen, von vorn bis hinten an dem Rande verflacht, Prosternum gekielt, wenigstens die vorderen Schienen zur Spitze verjüngt .... 4.

4. Rand der Decken mit groben, fingerartigen Zähnen, die Haupthöcker der Decken zapfenförmig. Clypeus beim Männchen mit zwei Zähnchen. (Philippinen.) .... **B. serratus** (Gebien).

Rand der Decken feiner, enger, nicht fingerartig gezähnt, die Höcker oder Körner des dritten Zwischenraumes nicht zapfenförmig, bei *spectabilis* zwar hoch erhaben, aber länglich. Rand des Clypeus selten gezähnt .... 5.

5. Clypeus des Männchens mit zwei Zähnen, die Hörner oder Schwielen auf dem Pronotum in diesem Geschlecht sind dicht aneinander gerückt.. 6.

Der Clypeus des Männchens bildet eine oft rauhe Querleiste, die Hörner auf dem Pronotum sind auseinander gerückt .... 8.

6. Körper fast quadratisch, hinten breit, gerade abgestutzt, Flügeldecken im dritten Zwischenraum mit drei dicken Höckern und kleineren in den andern, der verflachte Seitenrand des Pronotums oben gekörnt, beide Geschlechter mit zwei dicken, hohen Schwielen auf dem Halsschild. (Vorder- und Hinterindien, Sumatra.).. **B. gibber** Motschulsky.

Körper mehr oder minder gestreckt, hinten mehr oder minder halbkreisförmig gerundet, Flügeldecken im dritten Zwischenraum mit schmalen Höckern, der verflachte Rand des Pronotums ohne Körner.. 7.

7. Körper robust, Seitenrand der Decken breit sichtbar, dritter Zwischenraum mit drei grossen, länglichen Höckern, Männchen mit Schwielen auf dem Pronotum, Prosternum vorn schwach gekielt, über dem Unterkopf nicht hoch und spitz erhaben. Männchen mit zwei eng aneinander liegenden, vorn heruntergebogenen, unten behaarten Hörnern. (Borneo, Sumatra, Malacca.) .... **B. spectabilis** (Gebien).

Körper lang gestreckt, fast zylindrisch, dritter Zwischenraum nur wenig gröber gehöckert als die andern. Prosternum wagerecht und hoch gekielt, über dem Unterkopf stark und spitz erhaben. Männchen mit zwei runden Beulen auf dem Pronotum. (Philippinen.)
B. ditylus Gebien.

8. Die sehr dünnen, geraden Halsschildhörner des Männchens stehen im mittleren Drittel, die Seiten fast geradlinig nach vorn verengt, Hinterecken scharf rechtwinklig, Epistom des Männchens hoch lamellenförmig erhaben. (Sumatra.) .... **B. recticornis** sp. nov.

Die dickeren, gebogenen Hörner des Männchens liegen weit auseinander, die Seiten des Pronotums stark gebogen, Hinterecken stumpf, Epistom des Männchens leicht zweizähnig oder schwach gekielt.......... 9.

9. Exclusiv Hörner 5 bis 6 Millimeter gross, Flügeldecken mit einer Reihe grober Höcker im dritten Zwischenraum, Rand von oben nicht zu sehen, Hörner des wohlentwickelten Männchens nur an der Spitze mit Haarbüschel. (Sunda-Inseln.) (= *capricornis* Gebien.)
B. bifurcus Pascoe.

Sieben bis 9 Millimeter gross. Flügeldecken ziemlich gleichartig gekörnt, respektiv gehöckert, Rand der Decken von oben sichtbar, Hörner des gut entwickelten Männchens auch unten behaart. (Philippinen.) .... **B. timmi** Gebien.

10. Grössere Art aus Ceylon (und Siam ?). Männchen mit gekerbtem Clypealkiel, zwischen den Hörnern, die entfernt vom Vorderrand entspringen, kräftig punktiert, Glied 9 der Fühler so breit wie lang.
B. taprobanae (Lewis).

Kleinere Art aus Japan, Männchen mit ungekieltem Clypeus, zwischen den Hörnern, die ganz am Vorderrand des Pronotums stehen (die vordere Hälfte des Pronotums einnehmend) undeutlich punktiert. Glied 9 der Fühler stark quer.......... **B. bellicosus** (Lewis).

Bolitoxenus spathifer sp. nov. Tafel 1, Fig. 2, ♂.

Gross, fast zylindrisch, gestreckt, matt schwarz.

Der Kopf ist flach ausgehöhlt, stark, an den Seiten sehr grob punktiert; die Augen werden durch die Wangen bis über die Mitte geteilt, diese sind ziemlich lang, oben grubig vertieft, von dem Clypeus an den Seiten durch einen Winkel abgesetzt. In der Mitte des Epistoms erhebt sich beim Männchen ein sehr hohes, senkrechtes, von vorn nach hinten flachgedrücktes, oben verbreitertes und gerade abeschnittenes Horn. Die Fühler sind lang. Glied 1 ist sehr gestreckt, vom fünften an sind die Glieder innen immer spitzer erweitert, Glied 9 ist dreieckig, so breit wie lang, 10 und 11 bilden zusammen ein Oval.

Das Pronotum its doppelt so breit wie lang, die Seiten sind nicht sehr stark gebogen, die Hinterecken rechtwinklig, die vorderen ragen etwas spitz vor. Die Seitenrandkante ist ziemlich grob, aber nicht sehr tief gesägt. Jederseits der Mitte, genau zwischen dieser und dem Seitenrand, erhebt sich ein sehr langes, gerades, dünnes, an der Spitze mit Haarbüschel versehenes Horn. Die Hörner sind fein tuberkuliert, der Grund des Pronotums ist wenig eng und ziemlich fein gekörnt, nur zwischen den Hörnern deutlich punktiert, sonst glatt.

Die Flügeldecken sind fast zylindrisch gewölbt, der kräftig gekerbte Seitenrand ist von oben sichtbar. Es fehlen den Decken grobe Höcker, doch sind Reihen von kräftigen Körnern vorhanden, deren grösste die des dritten Zwischenraumes ist, wo sich 8 bis 10 Tuberkeln finden. Alle Zwischenräume sind sehr weitläufig, verschieden grob gekörnt; es sind ziemlich regelmässige Reihen tief eingestochener Punkte vorhanden, die nur durch die grossen Körner zuweilen etwas verdrängt werden, innerhalb der Punktstreifen fehlen Körner.

Das Prosternum ist vorn bis zum Grunde gesenkt, sehr schwach gekielt, zwischen den Hüften mit sehr schwacher Ecke versehen, dann schräg ganz abfallend und am Grunde mit kurzem Fortsatz; dieser passt in ein tiefes, dreieckiges Loch unten am Absturz des Mesosternums, das oben gekielt und vorn gezähnt ist. Am Hals des Mesosternums finden sich vorn zwei runde Grübchen. Das Abdomen ist fein, kurz und sparsam beborstet, das erste Segment ist grob quer gerunzelt, das zweite nur in der Mitte, es ist sonst wie die folgenden ziemlich grob punktiert. Alle Segmente sind hinten gewölbt, dadurch rinnig von den folgenden abgesetzt.

Länge, 11.5 Millimeter; Breite, 5.1.

Ein gut entwickeltes Männchen von Borneo, Sarawak, Mount Penrissan, 4,500 Fuss, Mai 17, 1899 (*Moulton*).

Diese ausgezeichnete Art ist die einzige der Gattung, bei welcher sich ein langes Clypealhorn findet; ihr nächster Verwandter scheint *B. dentifrons* Lewis von Japan zu sein, der aber noch länger gestreckt ist und ganz andere Bewaffnung des Kopfes und des Pronotums hat. Aber bei beiden ist das Prosternum vorn und hinten gesenkt.

Bolitoxenus dentifrons (Lewis).

Atasthalus dentifrons LEWIS, Ann. & Mag. Nat. Hist. VI 13 (1894) 385, t. 13, f. 4.

Diese Art hat mit *Atasthalus* nichts zu tun, aber auch in unserer Gattung bildet sie ein etwas fremdes Element; ich lasse sie aber in ihr, weil sie noch am besten in sie hineinpasst. Sie hat ungekieltes Prosternum, sehr lang gestreckten Körper, lange Beine, flache Gruben hinten auf dem Pronotum jederseits der Mitte, seine Seiten sind nach hinten stark eingezogen verengt und dort parallelseitig, aber nicht deutlich verflacht, doch mit scharfer Kante versehen. Das Analsegment ist sehr rauh, körnig, die andern sehr fein und dicht punktiert, die Schienen sind zur Spitze nicht verjüngt.

Nur in Japan.

Bolitoxenus serratus (Gebien). Tafel 2, Fig. 3, ♂.

Atasthalus serratus GEBIEN, Philip. Journ. Sci. § D 8 (1913) 383; Saraw. Mus. Journ. 2 (1914) 6.

Unsere Art entfernt sich von den meisten Gattungsgenossen durch die zwei spitzen Zähne des Clypeus, durch hohe, fast zapfenförmige Höcker des dritten Zwischenraumes, durch wenige (circa 13 bis 15) fingerartige Zähne am Seitenrand der Decken, durch vorn schräg abfallendes Prosternum und grosses Endglied der Fühler, das zwar dem zehnten eingefügt, aber viel deutlicher ist als bei irgend einer andern Art.

Von den Philippinen.

Bolitoxenus gibber Motschulsky.

Bolitoxenus gibber MOTSCHULSKY, Etudes Entom. 7 (1858) 63, f. 15.

Da die Beschreibung der Art unzureichend ist, erfolgt nach den mir jetzt vorliegenden Stücken (worunter eine Type aus dem Museum Berlin) eine neue.

Sehr breit, fast quadratisch, hinten breit und fast gerade abgestutzt.

Kopf in den Geschlechtern verschieden; beim Männchen ist der Vorderrand mit sechs starken Zähnen versehen, von denen die beiden äusseren die eckigvortretenden Wangen sind, die beiden mittleren sind dem Vorderrand des Clypeus aufgesetzt. Ferner finden sich zwei scharfe kleine Tuberkeln am Innenrand der Augen. Vor diessen ist eine stumpfe Beule. Der Kopf ist sehr uneben; zwischen den Augen verläuft eine gebogene Querfurche, vor deren Mitte sich zwei leichte Schwielen befinden, auch die Clypealnaht ist gut eingeschnitten. Die Augen sind bis zur Mitte geteilt. Beim Weibchen sind die Zähne des Vorderrandes sehr schwach, besonders die mittleren. An den Fühlern ist Glied 1 vorn leicht rundlich winklig erweitert, 3½ mal so lang wie breit, 4 ist etwas quer, aber nicht ausgezogen, die letzten sieben bilden eine deutliche Keule von queren, innen rundlich zahnförmig ausgezogenen Gliedern, 6 bis 9 sind vorn viel schmäler als hinten, 10 gleichbreit, fast 3 mal so breit wie lang, oben mit breitem Ausschnitt zur Aufnahme des eingefügten, ebenfalls queren elften Gliedes.

Halsschild stark quer, doppelt so breit wie lang, die Seiten sind stark verflacht, gerundet, auch zur Basis verengt, mit 8 bis 10 Zähnen versehen. Die Mitte der Scheibe hat in beiden Geschlechtern zwei sehr hohe Schwielen, die sich nur an der Spitze trennen und runde, gekörnte Knollen bilden. Der Absturz vorn bis zum Vorderrande ist senkrecht, beim Männchen dort leicht ausgehöhlt und wollig behaart, der ganze übrige Halsschild gekörnelt, die Körner ungleichmässig weit, eine Gruppe steht in der Mitte hinter den Schwielen, eine Reihe am Rande, der eigentliche Grund ist unpunktiert.

Die Flügeldecken sind so breit wie lang, die Seiten fallen hoch senkrecht ab, so dass der krenulierte Rand von oben nicht zu sehen ist; die ganze Oberfläche ist durch Körner und Schwielen uneben; es stehen drei grössere Höcker neben der Naht, die je aus einigen Tuberkeln bestehen, jeder Zwischenraum hat einzelne Körner. Die Punktreihen bestehen aus runden, tiefen, dicht stehenden Punkten, die aber von den grösseren Körnern aus der Reihe gedrängt werden.

Das Prosternum ist wagerecht, hoch gekielt, und fällt vorn senkrecht hoch ab, die Hinterecke des Kieles liegt zwischen den Hüften, so dass der hintere Absturz schräg ist, auch der Kiel des Mesosternums ist schräg. Die Spitze der kurzen Schenkel ragt über den Seitenrand der Flügeldecken nicht hinaus.

Länge, 7.3 bis 9.3 Millimeter; Breite, 5 bis 6.3.

Neunzehn Exemplare in den Sammlungen Berlin, Dresden, München, Leyden, und Gebien.

Ostindien, Malacca. Sumatra, Deli, Ober Langkat (*Reinsch*). Pulo Penang.

Die Art ist an dem robusten Körper und dem bei Männchen und Weibchen fast gleichgestalteten Halsschild zu erkennen.

Am nächsten verwandt ist *B. spectabilis* Gebien, aber beim Männchen sofort durch die Bildung des Halsschildes zu unterscheiden, dort sind die mittleren Höcker zu zwei langen, nach vorn gerichteten, eng aneinanderliegenden Hörner ausgezogen, der Körper ist flacher, daher der Seitenrand von oben breit sichtbar, der Vorderrand des Epistoms ist nicht deutlich 6-zähnig, beim Weibchen in der Mitte nicht gezähnt, das letzte Fühlerglied ist nicht annähernd so stark quer und ebenso wie die vorhergehenden vorn schmäler als hinten.

Bolitoxenus spectabilis (Gebien).

Bolitonaeus spectabilis GEBIEN, Saraw. Mus. Journ. 2 (1914) 4.

Von dieser Art liegt mir jetzt ein grösseres Material vor, besonders auch gut entwickelte Männchen, so dass einige ergänzende Bemerkungen nötig sind. Der scharf aufgeworfene Clypeus hat beim Männchen zwei starke Zähne, der Halsschild zwei sehr lange, unten behaarte Hörner. Das Prosternum ist zwar gekielt, aber der Kiel ist vorn nicht stark erhaben, sondern fällt gerundet bis zum Rande ab.

Malacca. Parak. Sumatra, Tandjong-Morawa, Serdang (*Hagen*); Liangagas (*Dohrn*); Soekaranda, Januar, 1894 (*Dorhn*). Borneo, Kuching, Oktober 19, 1898 (*Moulton*).

In den Sammlungen Berlin, Stettin, Gebien, Leyden, und Sarawak.

Bolitoxenus ditylus Gebien.

Bolitoxenus ditylus GEBIEN, Philip. Journ. Sci. 19 (1921) 446.

Der ausführlichen Beschreibung habe ich nichts hinzuzufügen.

Nur von den Philippinen.

Bolitoxenus recticornis sp. nov. Tafel 1, Fig. 3, ♂, Fig. 4, ♀.

Ziemlich schlank, fast zylindrisch, matt schwarz.

Der Kopf ist flach ausgehöhlt, sehr dicht, hinten grob, vorn feiner punktiert. Es ist eine leicht gebogene, quere, schwach eingedrückte Furche zwischen den Augen vorhanden, vor welcher sich vier im Quadrat stehende schwache Tuberkeln befinden. Die Clypealnaht ist sehr fein; die Wangen treten beim Männchen zahnförmig, beim Weibchen mehr rundlich vor und sind breiter als die Augen. Der Rand des Epistoms ist in beiden Geschlechtern scharfkielig erhaben, beim Männchen messerartig scharf, nicht krenuliert. Die Fühler sind schlank, Glied 1 zylindrisch, vorn nicht gebuckelt, 3 fast doppelt so lang wie dick, 4 schwach quer, 5 innen rundlich, die folgenden spitz ausgezogen, 8 ist stark quer, 9 an der Aussenkante so lang wie an der Spitze breit, 10 und 11 bilden ein Oval, 10 ist an der Spitze tief ausgeschnitten und nimmt das elfte dort auf, das von ihm kaum abgesetzt erscheint. Die linke Mandibel ist an der Spitze tief gespalten.

Der Halsschild ist fast doppelt so breit wie lang, die Seiten sind fast geradlinig, schwach nach vorn verengt, kräftig gekerbt, die Vorderecken ragen lang und spitz vor, die hinteren sind scharf rechtwinklig. Beim Männchen finden sich zwei gerade, dünne, nach vorn stehende Hörner, die ziemlich eng zusammenstehen, durch sie wird der Raum querüber in drei fast gleiche Teile geteilt, die Hörner sind gegeneinander gerichtet, fein tuberkuliert, und tragen an der Spitze einen ziemlich langen Haarschopf, bei einem Männchen sind sie auf zwei Spitzen reduziert die aber ebenfalls ein Haarbüschel tragen. Die Hörner überragen den Vorderrand, der Raum zwischen ihnen ist glatt, der hinter ihnen fein punktiert. Der ganze Halsschild ist ungleichmässig, aber gleich gross, nicht sehr dicht gekörnt, die Körner sind scharf erhaben, rund, der Rand its von vorn bis hinten gleichbreit verflacht. Beim Weibchen finden sich statt der Hörner zwei schwach erhabene, tuberkulierte Schwielen, welche durch eine glatte Mittelnaht getrennt sind.

Die Flügeldecken sind zwar hoch, fast zylindrisch gewölbt, doch ist der stark gezähnte Rand, der in den Zähnen verflacht ist, von oben deutlich sichtbar. Alle Zwischenräume sind gekörnt, der Nahtstreif hat eine Reihe feiner, hinten etwas enger stehender Körner, im dritten Raum stehen die grössten Körner, auch die des fünften und siebenten sind etwas grösser als die der andern, aber Höcker fehlen ganz. Die Punktreihen sind deutlich, die Punkte in ihnen grob und werden nicht aus den Reihen gedrängt.

Das Prosterum ist wagerecht, hinten mit scharfer Spitze versehen, vorn sehr stumpf gekielt und daher nur schwach über dem Unterkopf erhaben. Kiel des Mesosternums scharf, schräg abfallend. Abdomen auf allen Segmenten ziemlich grob punktiert. Beine dünn, Schenkel unten mit scharfem Doppelkiel, Schienen dünn, zur Spitze verjüngt, die mittleren Glieder der Tarsen stark schräge abgeschnitten.

Länge, 7.5 bis 10 Millimeter; Breite, 4 bis 5 (ohne Hörner).

Vier Männchen und 13 Weibchen in den Sammlungen Stettin, Leyden, und Gebien.

Sumatra, Soekaranda, Januar, 1894 (*Dohrn*); Liangagas (*Dohrn*); Serdang, Tandjong Morawa.

Mir liegen zwei verschiedene Weibchen vor, von denen ich nicht weiss ob sie zu dieser Art gehören. Bei dem Weibchen das ich hier zur Art gestellt habe, finden sich auf dem Pronotum zwei sehr schwache Erhabenheiten; beim anderen, das in allen andern Merkmalen mit ihm übereinstimmt, aber etwas kleiner ist (7 bis 8 Millimeter), finden sich zwei starke, weit vorragende, runde Tuberkeln. Es ist möglich dass diese Art zwei verschiedene Formen des Weibchens hat, ebenso wie sich bei *Atasthalus spectrum* und bei *Bolitoxenus bellicosus* zwei verschiedene Männchen finden.

Unsere Art ist im männlichen Geschlecht leicht an der Hornbildung zu erkennen, die Hörner sind auffallend dünn, gerade und weit nach innen gerückt, ferner fehlen auf den Decken die grossen Höcker.

Bolitoxenus bifurcus Pascoe.

Bolitoxenus bifurcus PASCOE, Ann. & Mag. Nat. Hist. IV 8 (1871) 350.
Bolitonaeus capricornis GEBIEN, Saraw. Mus. Journ. 2 (1914) 6, t. 1, f. 4.

Ich habe am oben angegebenen Orte angeführt, dass mich einige Bedenken, die beim Vergleich der Beschreibung von Pascoe mit dem mir vorliegenden Material auffielen, veranlassten eine neue Art aufzustellen.

Nachdem mir nun Herr Blair vom Britischen Museum eine Cotype (Weibchen) von Pascoe zur Ansicht übermittelte, stellt sich die Identität beider Arten heraus. Eine ausfürliche Beschreibung habe ich am angeführten Orte gegeben.

Mir liegen 45 Exemplare aus den Sammlungen Dahlem, Stettin, München, Gebien, Leyden, und Sarawak vor.

Sumatra, Serdang, Tandjong Morawa (*Hagen*); Tebingtinggi (*Schultheiss*); Soekaranda, Januar, 1894 (*Dohrn*); Liangagas (*Dohrn*); Palembang. Borneo, Kuching, Oktober 19, 1898; August 4, 1913 (*Moulton*).

Bolitoxenus timmi Gebien.

Bolitoxenus timmi GEBIEN, Philip. Journ. Sci. 19 (1921) 448.

Diese Art ist mit *B. bifurcus* sehr nahe verwandt, sie unterscheidet sich besonders durch bedeutendere Grösse (7 bis 9 statt 5 bis 6 Millimeter, ohne Hörner), die mehr gleichartige Körnelung der Decken, den schwächer gewölbten Hinterkörper, der Rand der Decken ist daher von oben mit allen Zähnen ganz sichtbar, bei *bifurcus* höchstens die Spitze der Zähne; ferner sind die Hörner des wohlentwickelten Männchens nicht nur an der Spitze, sondern auch unten in der Endhälfte behaart, bei der verwandten Art nur am Ende.

Von den Philippinen.

Bolitoxenus bellicosus (Lewis).

Atasthalus bellicosus LEWIS, Ann. & Mag. Nat. Hist. VI 13 (1894) 386, t. 13, f. 4.

Atasthalus bellicosus var. *incurvatus* LEWIS, Ann. & Mag. Nat. Hist. VI 13 (1894) 386.

Aus der Beschreibung von Lewis und der Abbildung geht zwar die richtige Stellung der Art hervor, aber gerade die entscheidenden Artkriterien werden nicht erwähnt. Ich füge daher einige Ergänzungen hinzu nach einem Pärchen (Cotypen!) die ich aus dem Britischen Museum tauschte.

Fühler nur mit 6-gliedriger Keule, Glied 9 und 10 schwach quer, 4 und 5 (beim Männchen nur 4) länger als breit. Mentum fast gekielt. Thorax 1½ mal so breit wie lang, die Seiten stark und gleichmässig gebogen. Flügeldecken im dritten Zwischenraum mit circa fünf länglichen, nicht stark erhabenen Höckern. Die Punktreihen sind Kettenstreifen, das heisst, zwischen je zwei Punkten findet sich in der Reihe ein kleines, unauffälliges Körnchen. Das Prosternum ist ganz wagerecht und auch vorn stark und hoch gekielt.

Japan, verschiedene Inseln.

Von dieser Art beschreibt Lewis zwei Formen des Männchens, die eine mit fast geraden Hörnern, die andere (var. *incurvatus*) mit fast kreisförmig gebogenen.

Bolitoxenus taprobanae (Lewis). Tafel 1, Fig. 5, ♂.

Atasthalus taprobanae LEWIS, Ann. & Mag. Nat. Hist. VI 13 (1894) 386.

Ceylon, Wackwaller bei Galle (*Pfeil-Reich* und *Nietner*). Neunzehn Exemplare in den Sammlungen Berlin, Stettin, Dresden, Gebien, und München. Im Museum Dresden ein Pärchen von Siam, doch bezweifle ich die Richtigkeit dieser Angabe.

Bei dieser Art sind Glied 9 und 10 der Fühler kaum breiter als lang. Die Decken sind wie bei voriger Art mit Kettenstreifen versehen, aber die Körnchen sind viel schärfer als bei *bellicosus*.

Genus **BOLITONAEUS** Lewis

Bolitonaeus Lewis, Ann. & Mag. Nat. Hist. VI 13 (1894) 387.

Typus der Gattung ist *B. mergae* Lewis. Es gehören zahlreiche Arten, die Lewis in die Gattung stellte, nicht hinein, sondern zu *Bolitoxenus,* wie ich dort anführte. Aber hineinzustellen sind *B. nasalis, B. vacca,* und *B. 4-dentatus.*

In diesem Umfange aufgefasst, ist eine Neubeschreibung von Nöten, die hier folgt:

Körper kurz zylindrisch, schwarz, geflügelt, von der Gestalt kurzer Ipiden. Kopf beim Männchen mit lamellenförmig erhabenem oder flachem Clypeus, Wangen viel schmäler als die Augen, welche von ihnen bis zur Mitte durchsetzt werden. Augenfalten fehlen. Die Fühler sind kurz, Glied 1 ist sehr lang, 3 länger als breit, die letzten bilden eine kräftige Keule von stark queren Gliedern, 10 ist am Ende breit ausgeschnitten zur Aufnahme des elften Gliedes. Das Endglied der Palpen ist lang zylindrisch. Die Mundteile liegen hoch erhaben, so dass sich zwischen ihnen und den Augen eine tiefe Fühlerfurche findet.

Halsschild beim Männchen mit 2 Hörnern, der Seitenrand nicht verflacht, aber fein krenuliert.

Flügeldecken zylindrisch, ungehöckert, mit Reihen feiner Tuberkeln, der Rand fast glatt oder fein krenuliert, von oben nicht sichtbar, der Abfall hinten senkrecht.

Prosternum vorn bis zum Rand heruntergebogen und hinten ohne Spitze, nicht oder undeutlich gekielt, Mesosternum mit Spitze. Das Metasternum ist zwischen den Hüften ausserordentlich kurz, Schenkel unten mit zwei scharfen Kanten, Schienen zur Spitze verjüngt, die vorderen mit ganz flacher Tarsenfurche, welche den Tarsen ein Aufwärtsschlagen ermöglicht, die mittleren Glieder sind schräge abgeschnitten, das Endglied ist sehr dick.

Diese Gattung bildet mit *Atasthalus* und *Bolitoxenus* zusammen eine Gruppe, welche durch ein kleines, dem zehnten aufsitzendes elften Fühlerglied, durch kräftige Fühlerfurche ausgezeichnet ist. Sie ist zu erkennen an dem kleinen, zylindrischen Körper ohne Höcker, dem ungekielten Prosternum, dem krenulierten, nicht gezähnten Körperrand, der sehr kurzen Hinterbrust.

Bestimmungstablle für die Bolitonaeus-Arten.

1. Alle Schienen sind aussen spitz gezähnt. (Sumatra.) .. **B. dentipes** sp. nov.
   Die Schienen höchstens leicht rundlich erweitert .... 2.
2. Der Rand des Pronotums ist grob gesägt, Flügeldecken mit unterbrochenen Rippen, Clypeus des Männchens mit vier Zähnen. (Ceylon.) **B. 4-dentatus** (Candeze).
   Rand des Pronotums fein gekerbt, Flügeldecken mit mehr oder minder feinen Körnerreihen, Clypeus beim Männchen mit einem blattartigen Horn oder nur mit einem zahnartigen Winkel jederseits als Ende der Wangen .... 3.
3. Clypeus des Männchens ohne Horn, Halsschildhörner dünn, am Ende mit feinem Haarbüschel, Decken kräftig gekörnt. (Japan.) **B. mergae** Lewis.
   Clypeus des Männchens mit Horn, Halsschildhörner ohne Haarbüschelchen, Deckenskulptur feinkörnig .... 4.
4. Hörner des Männchens auf dem Pronotum dick, schräg abgeschnitten und nach innen etwas hakenförmig erweitert, die vereinigten Glieder 10 und 11 bilden zusammen ein queres Glied. (Hinterindien. Sunda-Inseln.) .... **B. nasalis** (Pascoe).
   Hörner des Männchens dünn, gebogen, am Ende einfach, Glied 10 und 11 zusammen länger als breit. (Ceylon, Hinterindien, Sunda-Inseln, Philippinen.) .... **B. vacca** (Motschulsky).

Bolitonaeus vacca (Motschulsky). Tafel 2, Fig. 4.

Bolitoplegus vacca MOTSCHULSKY, Etudes Entom. 7 (1858) 64.

Die Beschreibung, welche der Autor gibt, ist knapp, aber durch Angabe der specifischen männlichen Merkmale doch einigermassen sicher. Zudem liegen mir aus dem Berliner Museum Stücke der Art vor, die als "Type" ausgezeichnet sind. Aber in Rücksicht auf die später entdeckten Arten ist eine kurze Neubeschreibung am Platze.

Zylindrisch, schwarz, matt, Flügeldecken sehr kurz, unauffällig, sparsam goldgelb behaart. Kopf flach ausgehöhlt, dicht punktiert; die Wangen bilden sehr schmale Zungen und sind nach vorn kurz, ziemlich geradlinig verengt. Das Epistom ist beim Männchen breit blattartig erhaben, nicht eigentlich hornartig, oben abgeschnitten, beim Weibchen fehlt dieses Horn und der Kopf ist leicht gewölbt. Die vereinigten Glieder 10 und 11 der Fühler sind etwas länger als breit. Das Pronotum ist dicht und grob punktiert, in den Zwischenräumen mehr oder minder kräftig gekörnt. Beim Mänchen erheben sich wagerecht nach vorn zwei ziemlich lange, gebogene, an der Spitze nicht behaarte Hörner. Die Seiten sind grob krenuliert, senkrecht. Flügeldecken mit groben Punktreihen, zwischen deren Punkte feine Körner stehen, Zwischenräume mit einer rauhen Körnerreihe, der Absturz ist senkrecht, der Seitenrand von oben nicht sichtbar.

Die ganze Unterseite ist ziemlich grob punktiert, Prosternum vorn und hinten niedergebogen, Beine kurz, die Schienen zur Spitze leicht verjüngt.

Länge, 3.5 bis 4.5 Millimeter (ohne Hörner).

Mir liegen 45 Exemplare vor aus den Sammlungen Berlin, Stettin, Dresden, Dahlem, München, Gebien, und Veth.

Burma (Originalfundort), Ostindien, Siam, Ceylon (*Nietner*); Sumatra, Tebing-tinggi (*Schultheiss*); Liangagas (*Dohrn*); Soekaranda, Januar, 1894 (*Dohrn*); Manna (*Knappert*); Deli, Ober Langkat (*Ude*). Borneo, Sarawak (*Doria*). Philippinen, Mindanao (*H. Peters*).

Die Art ist von *B. nasalis,* der eine ähnliche Verbreitung hat, durch geringe Grösse, andere Skulptur, und ganz andere Bewaffnung des Pronotums beim Männchen verschieden. Näher steht *B. mergae,* der grösser ist, sehr rauhe Flügeldecken und am Ende behaarte Hörner des Männchens hat; auch ist die Kopfbildung beim Männchen eine ganz andere. Beide Arten sind übrigens nackt oder fast kahl. Täuschend ähnlich ist aber die folgende Art.

Bolitonaeus dentipes sp. nov. Tafel 2, Fig. 5.

Von *B. vacca* nur durch die Beinbildung zu unterscheiden; ich verzichte daher auf eine ansführliche Beschreibung. Alle Schienen sind an der Aussenkante spitz gezähnt.

Länge, 3.3 bis 3.4 Millimeter.

Zwei Männchen von Nordost Sumatra, Tebing-tinggi (*Schultheiss*) in meiner Sammlung (Type!) und im Museum Dahlem.

Bolitonaeus nasalis (Pascoe). Tafel 1, Fig. 6, ♂; Tafel 2, Fig. 6.

Eledona nasalis PASCOE, Ann. & Mag. Nat. Hist. IV 8 (1871) 350.

Pascoe's Beschreibung ist zwar sehr kurz, aber die eigentümliche Gestalt der Hörner des Männchens ist so charakteristisch, dass unsere Art nicht leicht zu verkennen ist. Das Clypealhorn ist breit, hoch erhaben, oben abgeschnitten, blattförmig, die kurzen dicken Hörner des Pronotums sind gerade nach vorn gestreckt, vorn schräg nach innen abgeschnitten und innen etwas hakig erweitert. Glied 2 der Fühler ist zur Spitze verjüngt, die vereinigten Glieder 10 und 11 bilden zusammen ein stark queres Glied. Die Basalkante der Flügeldecken ist fein gekerbt, die Decken sind so fein staubartig behaart dass nur bei sehr starker Vergrösserung und ganz reinen (unreifen) Stücken die Behaarung erkennbar ist. Es sind Reihen dicht stehender, tiefer Punkte vorhanden. Die Zwischenräume haben eine Reihe von sehr flachen, glänzenden, etwas länglichen Körnchen. Das dritte und vierte Abdominalsegment sind hinten erhaben, 4 und 5 vorn breit vertieft. Die Beine sind sehr kurz, die Vorderschienen an der Aussenkante scharf, dort äusserst fein krenuliert.

Sechsig Exemplare in den Sammlungen Stettin, Dahlem, München, und Gebien.

Malacca, Penang (nach Pascoe). Sumatra, Liangagas (*Dohrn*), Soekaranda (*Dohrn*). Insel Mentawei, Sipora Sereinu, Mai bis Juni, 1894 (*Modigliani*).

Bolitonaeus mergae Lewis.

Bolitonaeus mergae LEWIS, Ann. & Mag. Nat. Hist. VI 13 (1894) 387, t. 13, f. 5.

Die Art ist vom Autor kenntlich beschrieben. Sie unterscheidet sich von den vorhergehenden Arten durch die sehr rauhen Flügeldecken, die recht grosse, runde Körner tragen. Die Decken sind nackt, die Hörner beim gut entwickelten Männchen am Ende behaart, der Kopf ist in diesem Geschlecht vor den Wangen geradlinig nach vorn verengt und hat weit vor den Augen eine scharfe Ecke. Das Epistom its vorn bogig vorgezogen und beim Männchen nicht erhaben.

Japan.

Bolitonaeus 4-dentatus (Candeze).

Bolitotherus 4-dentatus CANDEZE, Mem. Soc. Roy. Sc. Liege 12 (1861) 368.

Da die Beschreibung in einer schwer zugänglichen Zeitschrift erschienen ist, so wiederhole ich sie wörtlich und füge nach dem mir vorliegenden Material einige notwendige Ergänzungen hinzu.

Insect parfait

(♂) Entierement noir, opaque, couvert de granulations et d'aspérités. Front présantant en avant 4 dents fortes, les 2 externes sur le bord antérieur lui même, en devant des yeux, les 2 internes un peu en arrière de ce bord. Prothorax transversal, fortement échancré en demi-cercle en avant, ses côtés arqués et à bord decoupé en dents de scie, ces dents très fortes et au nombre de 6 à 7; muni de 2 longues cornes dirigées horizontalement, se recourbant l'une vers l'autre; son bord postérieur bisinué. Écusson petit. Élytres plus large que le prothorax, à peu près aussi larges que longues, présentant 9 côtés formées par de nombreux tubercules, d'inégale hauteur, les intervalles granuleux.

(♀) La femelle se distingue par le bord antérieur du front simple, complétement depourvu de dentelures et son prothorax sans cornes, sillonné longitudinalement au milieu.

L. 5, large 3 mm. Ceylon.

Beim Weibchen sind die Wangen erst winklig eingezogen, dann geradlinig nach vorn verengt mit deutlichem, zahnartigen Winkel vorn am Clypeus, die Seiten des Pronotums sind grobgezähnt, die ganze Scheibe ist kräftig tuberkuliert, die Skulptur der Decken besteht aus unterbrochenen Rippen und gekörnten Zwischenräumen, der Rand der Decken ist an der Schulter von oben sichtbar. Die Schienen sind ungezähnt. Das Männchen hat 4-zähnigen Clypeus, die mittleren beiden Zähne sind etwas grösser, die Hörner des Pronotums nackt, leicht nach innen gebogen, ziemlich kurz.

Sechszehn Exemplare von Ceylon (meist von Nietner gesammelt) in den Sammlungen Berlin, Dresden, München, und Gebien.

Genus **SUMBAWIA** novum

Gestreckt, flach, parallelseitig, geflügelt, ungehörnt, ungehöckert.

Kopf ohne Geschlechtsauszeichnung, flach, Hinterkopf schwach zu einem Hals verengt, Augenfurchen kurz und breit, Augenfalten fehlen. Die Augen sind vollständig geteilt, ihr oberer Teil ist sehr klein, schräg nach vorn gerichtet, die Wangen sind verrundet, etwas breiter als die Augen, der Vorderkopf ist sehr lang, einfach verjüngt, Espistom gerade abgestutzt, viel schmäler als die Stirn, Oberlippe scharf quer gekielt. Fühler mit verlängertem dritten Glied und starker 6-gliedriger Fühlerkeule. Der Unterkopf ist nicht erhaben, daher fehlen Fühlerfurchen ganz, letztes Glied der Maxillarpalpen dreieckig oval.

Der Halsschild ist quer, flach, ungehöckert, Seiten sehr scharfkantig verflacht, krenuliert, Vorderecken vorragend.

Die Flügeldecken haben gut entwickelte Schultern, sie sind scharf gerippt, ungehöckert, Epipleuren hinten verkürzt.

Prosterum ungekielt, flach, hinten heruntergedrückt, ohne Ecke, Mittelbrust V–förmig ausgeschnitten. Hinterbrust lang, Abdomen an den Hinterrändern der vorletzten Segmente ohne Querfurche und mit deutlicher Gelenkhaut. Beine dünn, Schenkel unten ohne scharfe Kante, Schienen gerade, zur Spitze nicht verjüngt, hinten nur am Grunde mit schwachem Kiel, Tarsen dünn, an den hinteren ist das erste Glied nicht verkürzt, sondern reichlich so lang wie 2 und 3 zusammen.

Die einzige mir vorliegende Art der neuen Gattung ist täuschend einem *Bradymerus* ähnlich, aber von dieser Gattung weit geschieden durch die vollständig geteilten Augen. Nur *Bole-*

tophagus, die bekannte europäische Gattung, welche in Asien nur in den nördlichen Gebieten (Sibirien, Nord-China, Japan) vorkommt, hat ebenfalls geteilte Augen. Von dieser Gattung ist aber unsere durch flachen Unterkopf und daher fehlende Fühlerfurchen und durch unvollständig gekielte Schienen verschieden, auch sind dort die Augen nur von den Wangen durchsetzt, bei *Sumbawia* aber durchdringen sie die Augen nur bis zur Hälfte und die Schläfen kommen ihnen bis zur Mitte entgegen, ausserdem ist das erste Glied der Hintertarsen so lang wie die beiden folgenden zusammen, bei *Boletophagus* dagegen stark verkürzt; ferner hat die letztere Gattung vollständige Epipleuren, *Sumbawia* aber verkürzte. Keine andere asiatische Gattung der Boletophagiden hat geteilte Augen. Ferner sollen die europäische Gattung *Eledonoprius* Reitter (gegründet auf *Boletophagus armatus*) und die nordamerikanische *Eleates* geteilte Augen haben. Für die erstere aber trifft das nicht zu, hier sind die Augen nur stark eingeschnürt, was merkwürdigerweise überall übersehen zu sein scheint. Weder Reitter noch Seidlitz machen darauf aufmerksam, sondern nennen die Augen bei der Gattungsbeschreibung von *Boletophagus* geteilt. Seidlitz trennt *armatus* nicht ab und Reitter gibt andere Unterschiede von *Boletophagus. Eleates* ist kaum von *Boletophagus* zu unterscheiden.

Sumbawia tetrops sp. nov. Tafel 1, Fig. 7; Tafel 2, Fig. 7.

Ziemlich klein, parallelseitig, schwarzbraun, Unterseite, Fühler, und Beine rotbraun.

Der Kopf ist so breit wie lang, die Augenfurchen sind grübchenförmig und gehen nach hinten nur bis zur Hinterecke des Auges. Die Wangen sind breiter als die Augen, ganz verrundet, nach vorn stark, nicht eingezogen verengt, der Rand läuft mit dem schräg nach vorn gerichteten Vorderrand der Augen nicht parallel, das Epistom ist viel schmäler als die Stirn, gerade abgestutzt, seine Ecken sind breit verrundet. Die Querfurche ist nur als ganz undeutlicher Eindruck erkennbar. Die Punktierung ist grob und dicht, die Zwischenräume der Punkte sind besonders hinten kräftig erhabene, lange Längsrunzeln. Die Fühler sind schlank, die ersten Glieder dünn, Glied 3 ist 1½ mal so lang wie 4, 4 und 5 sind so breit wie lang, die letzten sechs sind stark quer, gut getrennt, das elfte so breit wie lang, scharf vom zehnten getrennt. Der untere Teil des Auges ist halbmondförmig, mit der geraden Seite nach hinten, die untere Ecke ist von einer breiten, flachen Furche begleitet, das Kinn ist scharf längsgekielt.

Das Pronotum ist etwas schmäler als die Flügeldecken, 1½ mal so breit wie lang, flach gewölbt, die Seiten sind mässig stark gerundet, die Vorderecken liegen nur sehr wenig weiter nach innen als die hinteren, die grösste Breite liegt etwas hinter der Mitte. Die Hinterecken sind scharf rechtwinklig, die vorderen vorgezogen, spitz, aber an der äussersten Ecke verrundet. Der Rand ist kräftig krenuliert, die Seiten sind ziemlich breit und scharf verflacht, fast etwas furchig vertieft, die Mitte des Vorderrandes ist leicht vorgezogen. Die Scheibe hat eine flache Mittelfurche, die Punktierung ist grob, die Zwischenräume der Punkte fliessen zu langen Längsrunzeln zusammen, auf denen sich hin und wieder sehr feine Pünktchen finden.

Die Flügeldecken sind lang, parallel, die glatte Seitenrandkante ist von oben nirgends sichtbar. Es sind Furchen mit groben, runden, tief eingedrückten Punkten vorhanden, alle Zwischenräume sind hoch gekielt, der Kiel des ersten ist in der Mitte verflacht und unterbrochen, 2, 4, 6 sind an der Basis etwas, hinten stärker verkürzt und dort in Körner aufgelöst, 7 und 8 laufen vereinigt in die Spitze. Die Kiele sind nicht ganz glatt, sondern unter dem Mikroskop unterhalb der schärfsten Kante dicht punktiert, wodurch die Kante selbst etwas rauh erscheint. Die Zwischenräume zeigen Porenpünktchen mit sehr kurzen, unauffälligen Börstchen.

Die ganze Unterseite ist ziemlich grob und dicht punktiert, besonders das Prosternum, dieses auch in der Mitte, sein Fortsatz ist ganz niedergedrückt. Die Mittelbrust hat deutliche Ecken, die Hinterbrust hat einen durch eine breite Querfurche abgeschnürten Vorderlappen, die Hinterecken in der Mitte sind scharf gewinkelt und durch eine feine Furche gerandet; die Mitte der Hinterbrust ist feiner und weitläufiger punktiert. Die Punkte des Abdomens sind nicht gedrängt, jeder hat am Vorderrande ein anliegendes, gelbes Härchen, das nur bis zum Hinterrand reicht und nur unter starker Vergrösserung sichtbar ist. Die Beine sind dünn, die Schenkel beim Männchen an der Unterseite vor der Mitte mit einer Reihe feiner, kurzer, gelber Härchen, die Hinterschienen in diesem Geschlecht vorn mit anauffälligem Saum gelber Härchen, beim Weibchen dort nur einzeln behaart, die Hintertarsen sind dünn und lang.

Länge, 7.3 bis 8.5 Millimeter; Breite, 3.1 bis 3.6.

Drei Männchen und ein Weibchen von Sumbawa (*Doherty*) in meiner Sammlung.

Die Art ist dem gemeinen *Bradymerus clathratus* (*aequecostatus*) sehr ähnlich, besonders auch in der Skulptur der Decken, doch sind die Rippen viel höher, die Punkte der Streifen fast grübchenförmig, der Halsschild ist schmäler als die Decken, die Seiten sind krenuliert, Kopf und Halsschild sind längsrunzlig. Sie ist aber generisch durch die Augenbildung verschieden.

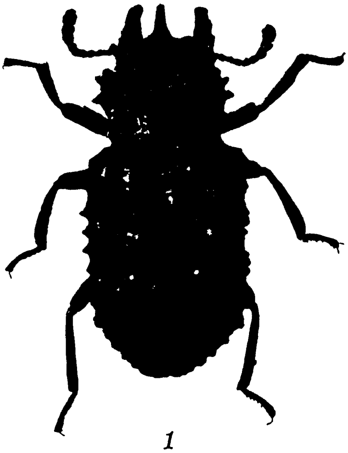
ILLUSTRATIONEN

TAFEL 1

FIG. 1. *Atasthalus rhinoceros* sp. nov., Männchen, 5 ×.
2. *Bolitoxenus spathifer* sp. nov., Männchen, 5 ×.
3. *Bolitoxenus recticornis* sp. nov., Männchen, 3 ×.
4. *Bolitoxenus recticornis* sp. nov., Weibchen, 3 ×.
5. *Bolitoxenus taprobanae* (Lewis), Männchen, 5 ×.
6. *Bolitonaeus nasalis* (Pascoe), Männchen, 6 ×.
7. *Sumbawia tetrops* sp. nov., 5 ×.

TAFEL 2

FIG. 1. *Atasthalus spectrum* Pascoe, Vorderkörper, Männchen, Stammform.
2. *Atasthalus spectrum* Pascoe subsp. *callosus* Gebien, Vorderkörper, Männchen.
3. *Bolitoxenus serratus* (Gebien), Pronotum, Männchen.
4. *Bolitonaeus vacca* (Motschulsky), Vorderkörper, Männchen.
5. *Bolitonaeus dentipes* sp. nov., Mittelbein.
6. *Bolitonaeus nasalis* (Pascoe), Vorderkörper, Männchen.
7. *Sumbawia tetrops* sp. nov. Kopf, *a*, von vorn; *b*, von der Seite.



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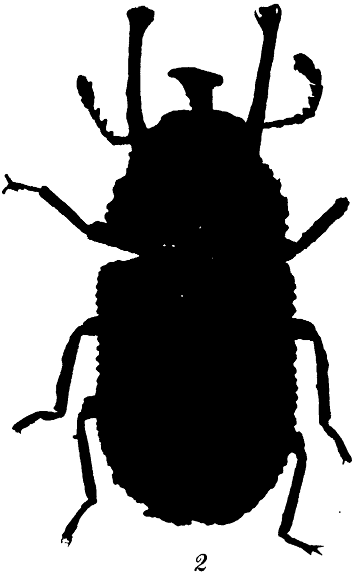

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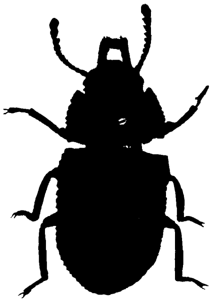

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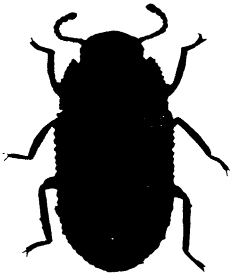

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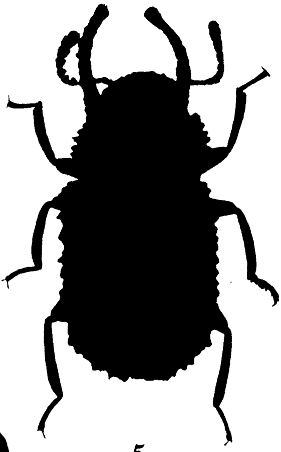

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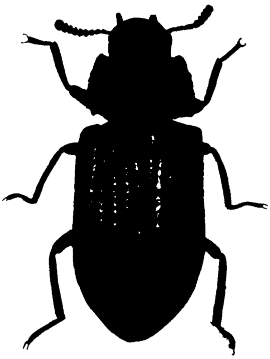

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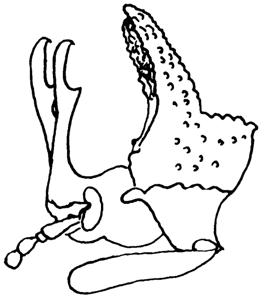

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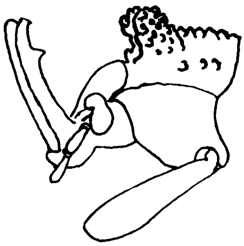

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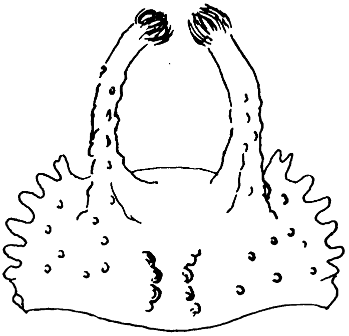

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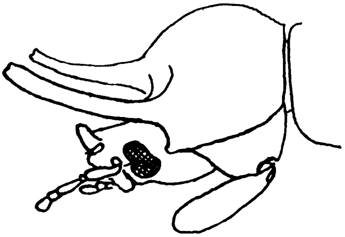

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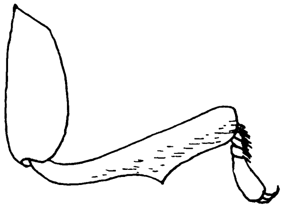

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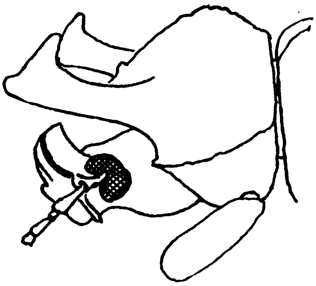

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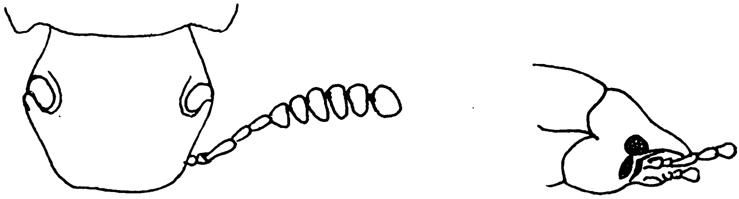

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THE PHILIPPINE JOURNAL OF SCIENCE

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ADDITIONS TO OUR KNOWLEDGE OF THE PHILIPPINE FLORA, I

By ELMER D. MERRILL

Of the University of California, Berkeley

In August, 1921, the manuscript of my enumeration of Philippine flowering plants[1] was completed and, naturally, to avoid certain complications that would be involved had I continued to publish papers on the Philippine flora, no additional ones were prepared, and to a considerable degree I devoted my time to the study of extra-Philippine material. From time to time, however, descriptions of various apparently new Philippine forms were prepared, and these are presented herewith.

The enumeration of Philippine flowering plants contains 1,524 genera and 8,030 species, which are more or less definitely established. The present contribution adds three genera, *Mappia, Lettsomia,* and *Didymocarpus,* to the Philippine list, as well as fifty-four species; all but one of the latter are described as new. The types are preserved in the herbarium of the Bureau of Science but, as in the past, duplicates, so far as they were available, have been distributed to the larger botanical institutions in the United States and in Europe, notably the United States National Herbarium, the Royal Gardens at Kew, England, the Paris Museum of Natural History, the Berlin Botanic Gardens, and other institutions.

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[1] Merrill, Elmer D., An Enumeration of Philippine Flowering Plants. Bur. Sci. Publ. 18: 1 (1923–1925) 1–463; 2 (1923) 1–530; 3 (1923) 1–628; 4, in press.

PANDANACEÆ

Genus **PANDANUS** Linnæus

Pandanus depauperatus sp. nov.

Species *P. reclinato* affinis, differt syncarpiis drupisque majoribus, foliis latioribus, syncarpiis ellipsoideis.

Erect, unbranched, practically acaulescent, about 60 cm high, the stems less than 1 cm in diameter, the part below the terminal rosette of leaves rather densely covered with the remains of the vascular bundles of decayed leaves, and also emitting several elongated unarmed roots about 5 mm in diameter. Leaves linear, chartaceous, slenderly acuminate, scarcely narrowed below, about 50 cm long, 2 cm wide, plicate below, the midrib beneath in the lower part with scattered, conspicuous, retrorse spines, the marginal teeth slender, sharp, 1 mm long or less. Syncarps solitary, erect, ellipsoid, red when mature, about 7 cm long, 4 cm in diameter, the peduncles slender, about as long as the syncarp, about 4 mm in diameter, 3-angled. Drupes numerous, at least 80 in each syncarp, 2 cm long, up to 1 cm in diameter, united for the lower three-fourths, narrowed below, mostly 5-angled, 1-celled, the free portions subpyramidal, angled, rostrate, the beak stout, straight or nearly so, about 3 mm long, the stigma truncate, about 1.5 mm in diameter.

BUSUANGA, Concepcion, *Bur. Sci. 41230 Ramos,* September, 1922. Along small streams in bamboo thickets at low altitudes.

The alliance of this species is manifestly with *Pandanus reclinatus* Martelli of Palawan, and additional collections may show that but a single species is represented. The Busuanga form differs from the single collection available representing the Palawan form, the type of Martelli's species, in its ellipsoid, not globose, larger syncarps, and more numerous and larger drupes.

Pandanus calamianensis sp. nov. § *Ryckia.*

Caulis circiter 1 m alta, 5 ad 6 cm diametro, ut videtur simplex; foliis numerosis, circiter 2 m longis et 7 cm latis, coriaceis, in siccitate pallidis, nitidis, sursum sensim angustatis, acuminatis, margine perspicue spinuloso-serratis, spinulis inferioribus usque ad 4 mm longis, superioribus minoribus; syncarpiis solitariis, erectis, cylindraceis, circiter 12 cm longis et 6 cm diametro (vix maturis), leviter trigonis; drupis numerosissimis, confertis, 1-locellatis, circiter 2.5 cm longis, 1 cm diametro, deorsum connatis, partibus liberis ovoideis, rotundato-angulatis; stylis induratis, nitidis, spiniformis, plerumque furcatis, inflexis vel adpressis, 7 ad 9 mm longis.

Stems about 1 m high. apparently unbranched, 5 to 6 cm in diameter. Leaves numerous, crowded, about 2 m long, 7 cm wide, coriaceous, pale when dry, shining, narrowed upward, acuminate, the acumen up to 10 cm long, spinulose, the margins spinulose, in the lower part the spinelike teeth up to 4 mm long, in the upper part closer and somewhat smaller, the midrib beneath with widely scattered small teeth. Syncarps solitary, erect, cylindric or somewhat trigonous, about 12 cm long, 7 cm in diameter, inclosed by the leaflike bracts, the peduncles up to 40 cm long, 2 cm in diameter, trigonous. Drupes very numerous, arranged in nearly straight vertical rows, crowded, 1-celled, about 2.5 cm long, 1 cm in diameter, united for the lower two-thirds, the free parts ovoid, rounded-angular, the styles spiniform, mostly furcate, indurated, pale, shining, ascending or appressed, sharply acuminate, 7 to 9 mm long.

BUSUANGA, Calamian Islands, *Bur. Sci. 41178 Ramos,* September 23, 1922. In forests along small streams at low altitudes.

Local name, *balitbit.*

A strongly marked species in alliance with *Pandanus furcatus* Roxb., from which it is at once distinguishable by its much smaller syncarps and drupes. A fairly high percentage of the drupes present simple rather than furcate styles.

Pandanus busuangaensis sp. nov. § *Hombronia.*

Frutex 2 ad 3 m altus, caulis circiter 10 cm diametro; foliis coriaceis, circiter 2 m longis et 6 cm latis, sursum sensim angustatis, tenuiter caudato-acuminatis, margine grosse spinulosis, dentibus spiniformis inferioribus usque ad 5 mm longis, superioribus minoribus; syncarpiis solitariis, erectis, ellipsoideis, circiter 15 cm longis et 9 cm diametro; drupis numerosis, circiter 3 cm longis, 1.5 ad 1.8 cm diametro, 4- vel 5-angulatis, subliberis, 2-locellatis, apice subtruncato-rotundatis, transverse sulcatis, areolis binis instructis.

A shrub 2 to 3 m high, the trunk about 10 cm in diameter. Leaves coriaceous, pale and shining when dry, about 2 m long and 6 cm wide, gradually narrowed upward to the slenderly caudate-acuminate apex, the acumen trigonous, spinulose, the margins conspicuously spinulose, the lower teeth up to 5 mm long, very rigid, more widely scattered than are the upper smaller ones, the midrib beneath in the upper part rather finely spinulose, near the base with large, very stout, retrorse teeth. Syncarp solitary, erect, ellipsoid, more or less inclosed by the leaflike bracts, about 15 cm long and 9 cm in diameter. Drupes numerous, 2-celled, about 3 cm long, 1.5 to 1.8 cm in diameter, sharply 4- or 5-angled, nearly free (that is, hardly connate), slightly narrowed below, the apical parts subtruncate-rounded, transversely sulcate between the two short stigmas, and with two apical areolæ 4 to 5 mm in diameter, the very short indurated stigma situated on the inner margin of each areola.

BUSUANGA, *Bur. Sci. 41224 Ramos,* September 20, 1922. Near the seashore.

A species manifestly belonging in the group with *Pandanus kaida* Kurz of Burma, but with much smaller drupes.

Pandanus paracalensis sp. nov. § *Hombronia?*

Arbor circiter 5 m alta; foliis circiter 2.5 m longis et 6 cm latis, rigidis, crasse coriaceis, sursum sensim angustatis, caudato-acuminatis, margine spinulosis, deorsum plicatis, costa subtus in partibus superioribus minute serrulatis, deorsum inermis; syncarpiis solitariis, ellipsoideis vel subcylindraceis, 24 cm longis, 11 cm diametro; drupis numerosis, 4- vel 5-locellatis, circiter 4 cm longis, 2.5 cm diametro, deorsum angustatis, partibus liberis circiter 1 cm longis, 4- vel 5-angulatis, rotundatis, apice truncatis, trapezoideis, circiter 1 cm longis et 6 mm latis; stylis 4 vel 5, minutis.

A tree about 5 m high, the trunk 10 cm in diameter. Leaves rigid, thickly coriaceous, pale when dry, rather dull, about 2.5 m long, 6 cm wide, narrowed upward to the slenderly caudate-acuminate apex, the basal parts plicate, the margins spinulose throughout, the teeth rather small, the midrib beneath in the upper part of the leaf minutely toothed, in the lower part of the leaf unarmed. Syncarps solitary, apparently erect, ellipsoid or subcylindric, about 24 cm long, 11 cm in diameter. Drupes numerous, about 4 cm long, 4- or 5-celled, angled, narrowed below from the upper three-fourths, the apical fourth free, rounded, somewhat angled, the tip truncate, trapezoidal, 4- or sometimes 5-angled, the truncate surface about 1 cm long and 6 mm wide, with a minute and obscure stigma at each angle.

LUZON, Camarines Norte Province, Paracale, *Bur. Sci. 33687 Ramos and Edaño,* November 30, 1918. In forests along small streams at low altitudes.

A strongly marked species, not only by its elongated, relatively narrow rigid leaves, but also by its ellipsoid or cylindric, solitary syncarps which are 24 cm in length, and by the truncate trapezoidal apices of its 4- or 5-celled drupes, the minute and obscure stigmas being borne at the angles of the truncate trapezoidal surface.

ARACEÆ

Genus **RAPHIDOPHORA** Hasskarl

Raphidophora palawanensis sp. nov.

Scandens, 3 ad 4 m alta, foliolum petiolus circiter 35 cm longus et 1 cm crassus, canaliculatus, haud vaginatus; lamina circiter 1 m longa, usque ad costam pinnatifida segmentis basi perspicue pertusis; segmentis utrinque circiter 20, majoribus circiter 25 cm longis, 4.5 cm latis, chartaceis, olivaceis, nitidis, utrinque concoloribus, 2- vel 3-nerviis, deorsum leviter angustatis, apice oblique truncatis, infimis atque superioribus quam intermedia brevioribus; spadicibus fructiferis cylindraceis, 8 ad 13 cm longis, circiter 2 cm diametro, obtusis; fructibus circiter 6 mm longis, apice circiter 2 mm diametro, truncato.

Scandent on the trunks of trees, 3 to 4 m high. Leaves, including the petioles, about 1.3 m long, the petioles subterete, 35 cm long, about 1 cm in diameter, shallowly and broadly canaliculate, not sheathing, the lamina about 1 m long, 50 cm wide in the middle, the segments about 20 on each side, free, each intermediate one with a conspicuous perforation at the base, the shorter apical and basal segments entire; intermediate segments 25 cm long, 2.5 to 4 cm wide, somewhat narrowed below, the apex obliquely truncate, the lower angle broadly rounded, the upper somewhat acuminate, all olivaceous, chartaceous, shining, of the same color on both surfaces, 2- or 3-nerved, with from 2 to 5 slender secondary nerves between the primary ones, reticulate, the apical and basal segments shorter than the intermediate ones, and imperforate. Peduncles about 12 cm long. Spadices, in fruit, cylindric, 8 to 13 cm long, about 2 cm in diameter, rounded at both ends, the individual fruits very numerous, about 6 mm long, narrow, the apices truncate, about 2 mm in diameter.

PALAWAN, Malampaya Bay, *Merrill 11570*, October 8, 1922. On trees in primary forests, altitude about 20 meters.

A species in general alliance with *Raphidophora copelandii* Engl., but at once distinguished from this by its very much larger leaves, and from all hitherto described species in the group by the conspicuous perforations at the base of the intermediate segments, a single perforation on each segment, variable in shape, from 8 to 18 mm long.

Raphidophora sylvestris Engl.

Raphidophora sylvestris (Blume) ENGL. in DC. Monog. Phan. 2 (1879) 239, Pflanzenreich 37 (1908) 22, *f. 6.*
Calla sylvestris BLUME, Cat. Gew. Buitenzorg (1823) 62.

PALAWAN, Candaoaga, *Bur. Sci. 15527 Fénix,* July 17, 1912, climbing on trees at low altitudes. Borneo, Java, New Guinea.

The specimen, originally determined as *Scindapsus* sp., agrees very closely with the description of Blume's species. New to the Philippines.

Genus **AGLAONEMA** Schott

Aglaonema stenophyllum sp. nov.

Caudex erectus, usque ad 25 cm altus; foliis numerosis, subconfertis, anguste lanceolatis, utrinque subaequaliter angustatis, usque ad 22 cm longis, 2 ad 3 cm latis, apice plerumque tenuiter acuminatis, basi cuneatis, nervis primariis utrinque 5 ad 7, tenuibus, quam secondariis multo validioribus, oblique adscendentibus; fructibus ellipsoideis, circiter 12 mm longis.

Caudex erect, up to 25 cm high, 1 to 1.5 cm in diameter. Leaves numerous, somewhat crowded, narrowly lanceolate, 18 to 22 cm long, 2 to 3 cm wide, subequally narrowed to the cuneate base and to the usually slenderly acuminate apex, membranaceous to chartaceous when dry, olivaceous, shining; primary lateral nerves 5 to 7 on each side of the midrib, sharply ascending, slender but much more prominent than are the secondary nerves; petioles 6 to 8 cm long, the sheathing margins conspicuous, extending to within less than 1 cm of the base of the lamina. Inflorescences unknown, the peduncles in fruit 10 to 15 cm long. Fruits ellipsoid, red or yellowish red, about 12 mm long.

LUZON, Tayabas Province, east coast, Mount Cadig, *Bur. Sci. 25413 Yates,* December, 1916. BILIRAN, *Bur. Sci. 18844 McGregor,* June, 1914. CATANDUANES, *Bur. Sci. 30471 Ramos* (type), November, 1917. SAMAR, Catubig River, *Bur. Sci. 24141 Ramos,* February, 1910. In damp primary forests up to an altitude of 400 meters.

A strongly marked species, distinguishable among all the hitherto described forms by its relatively very narrow leaves.

MENISPERMACEÆ

Genus **CYCLEA** Arnott

Cyclea cauliflora sp. nov.

Frutex scandens, ramulis teretibus, circiter 1.5 mm diametro, longitudinaliter sulcatis, leviter hirsutis; foliis chartaceis vel submembranaceis, ovatis, usque ad 15 cm longis, basi truncato-rotundatis, late peltatis, apice tenuiter acute subcaudato-acuminatis, supra glabris, nitidis, olivaceis, subtus molliter parceque pubescentibus; infructescentiis caulinia, tenuiter longe pedunculatis, pyramidatis, paniculatis, circiter 12 cm longis, ramis inferioribus circiter 5 cm longis, sordide pubescentibus; drupis compressis, suborbicularis vel obovoideis, circiter 5 mm longis, nigris, glabris, verruculosis.

A scandent shrub, the stems or larger branches glabrous, the branchlets slender, terete, sulcate, about 1.5 mm in diameter, slightly hirsute. Leaves chartaceous or submembranaceous, when dry olivaceous, shining, ovate, 8 to 15 cm long, 7 to 11 cm wide, the base broadly truncate-rounded, peltate, the petiole inserted 1 to 1.5 cm from the margin, the apex slenderly and acutely subcaudate-acuminate, the upper surface glabrous when fully mature, or with few scattered long hairs near the insertion of the petiole, the lower surface somewhat paler and softly pubescent with short scattered hairs; petiole about 7 cm long. Infructescences paniculate, cauline, pyramidal, about 12 cm long, the lower branches about 5 cm long, pubescent, the slender peduncle nearly as long as the panicle. Flowers not seen. Drupes compressed, orbicular to obovate, about 5 mm long, black, glabrous, and verruculose when dry, their pedicels about 5 mm long. Persistent stigmas on young fruits 3- to 5-fid, the lobes lanceolate, acuminate, up to 1 mm long. Very immature fruits somewhat pubescent.

LEYTE, Cabalian, *Bur. Sci. 41512 Ramos,* December 7, 1922. In damp ravines and in deserted clearings, altitude about 300 meters.

A species apparently most closely allied to the Bornean *Cyclea robusta* Becc., but not directly comparable, as the pistillate flowers and fruits of Beccari's species are unknown. It differs in its smaller leaves which are more narrowly peltate, while the staminate panicles of Beccari's species are much larger than are the pistillate ones of the Philippine form.

ANONACEÆ

Genus GONIOTHALAMUS Hooker f. and Thomson

Goniothalamus mindorensis sp. nov.

Arbor parva, glabra; foliis subcoriaceis, oblongis, usque ad 24 cm longis et 7.5 cm latis, breviter acuminatis, basi acutis, in siccitate admodum nitidis, supra pallide olivaceis, subtus pallide brunneis, minutissime et densissime puncticulatis, nervis utrinque circiter 12, tenuibus, distinctis; floribus extra-axillaribus, breviter pedicellatis, solitariis, circiter 5 cm longis, petalis crasse coriaceis, exterioribus lanceolatis, longe rostrato-acuminatis, margine inflexis, interioribus ovatis, 2 cm longis, acutis; carpellis numerosis, pubescentibus, stylis elongatis, curvatis, 4 mm longis.

A glabrous tree about 4 m high, the very tips of the branchlets appressed cupreous pubescent, the ultimate branches terete, brownish, 3 to 4 mm in diameter. Leaves oblong, subcoriaceous, 19 to 24 cm long, 6 to 7 cm wide, shortly acuminate, base acute, somewhat shining when dry, the upper surface pale olivaceous, the lower surface pale brownish and densely and minutely puncticulate; lateral nerves about 12 on each side of the midrib, slender, distinct, anastomosing, the reticulations lax, not prominent; petioles stout, 6 to 10 mm long. Flowers extra-axillary, solitary, pink or reddish, about 5 cm long, their pedicels thickened upward, about 1.5 cm long. Sepals coriaceous, glabrous, ovate to triangular ovate, acute, about 11 mm long. Outer three petals lanceolate, about 5 cm long, coriaceous, glabrous, base broad, narrowed upward into the long-acuminate, rostrate tip, this portion about 3 cm long, subterete by the inflexed margins, and 2 to 3 mm in diameter; inner three petals ovate, acute, glabrous or with very few hairs near the apex, very thickly coriaceous, 2 cm long. Stamens numerous, about 3.5 mm long, the tips of the connectives somewhat rounded. Carpels many, oblong, pubescent; styles elongated, curved, 4 mm long.

MINDORO, Mount Bacauan, near Pinamalayan, *Bur. Sci. 41017 Ramos,* June 17, 1922. On forested slopes, altitude about 700 meters.

A species in vegetative characters, other than the puncticulate lower surface of the leaves and fewer lateral nerves, approximating *Goniothalamus philippinensis* Merr. and *G. trunciflorus* Merr., but with totally different flowers. It is strongly characterized by its elongated outer petals being narrowed into the long, rostrate acumen, the narrowed portions being longer than the broader basal parts.

Genus **MITREPHORA** Hooker f. and Thomson

Mitrephora caudata sp. nov.

Arbor parva, ramis teretibus, glabris, ramulis junioribus ferrugineo-pubescentibus; foliis chartaceis, utrinque glabris, oblongo-ellipticis ad oblongo-lanceolatis, usque ad 14 cm longis, pallidis vel subolivaceis, nitidis, basi acutis, apice subcaudato-acuminatis; nervis utrinque circiter 8, perspicuis; floribus circiter 2.5 cm diametro, petalis exterioribus 13 mm longis, 8 ad 9 mm latis, oblongo-ovatis, obtusis, extus leviter pubescentibus, interioribus arcuatis, unguiculo 11 mm longo, 2 mm lato, apice excepto glabro; fructibus subglobosis, circiter 1 cm diametro, adpresse ferrugineo-pubescentibus. Species *M. lanotan* (Blanco) Merr. affinis.

A small tree, the branches and branchlets slender, terete, the former glabrous, the younger branchlets ferruginous-pubescent. Leaves chartaceous, glabrous on both surfaces, pale to subolivaceous when dry, shining, 9 to 14 cm long, 3 to 5 cm wide, base acute, apex subcaudate-acuminate; lateral nerves about 8 on each side of the midrib, impressed on the upper surface, prominent beneath; petioles 5 to 8 mm long. Flowers pale yellow, fragrant, about 2.5 cm in diameter. Calyx 7 mm in diameter, the lobes broadly ovate, acute, pubescent, 3 mm long. Outer petals about 13 mm long, 8 to 9 mm wide, oblong-ovate, slightly pubescent outside, glabrous within, scarcely narrowed below. Claw of the inner petals about 11 mm long, 2 mm wide, entirely glabrous except at the tips under the arch where they are united, here densely villous. Carpels about 1 mm long, villous. Anthers numerous, 1 mm long. Fruits subglobose, about 1 cm in diameter, more or less appressed ferruginous-pubescent, the indumentum usually not dense.

PALAWAN, near Puerto Princesa, *For. Bur. 29112* (type), *29129 Cenabre*, February, 1922. *Bur. Sci. 809, 886 Foxworthy*, April and May, 1906, *Elmer 12787, 13012*, March and April, 1911, distributed as *Mitrephora lanotan* Merr. In forests at low altitudes.

The present species is manifestly allied to the Luzon *Mitrephora lanotan* (Blanco) Merr., but differs in its entirely glabrous, more slenderly acuminate, somewhat fewer-nerved leaves; its smaller flowers, the claws of the inner vaulted petals being glabrous on both surfaces, and its less-pubescent fruits, the indumentum being often scanty, always appressed, and never spreading as in the Luzon form.

Genus **OXYMITRA** Hooker f. and Thomson

Oxymitra mindorensis sp. nov.

Frutex scandens, leviter pubescentibus, ramulis teretibus, circiter 1 mm diametro; foliis chartaceis, oblongis ad oblongo-lanceolatis, usque ad 21 cm longis, acuminatis, basi rotundatis vel obscure cordatis, brevissime petiolatis, supra olivaceis, glabris nitidis, subtus glaucis, ad costa nervisque leviter pubescentibus, nervis utrinque circiter 20, perspicuis; floribus solitariis, extra-axillaribus, angustissime lanceolatis, 7 cm longis, tenuissime pedicellatis, extus plus minusve ferrugineo-pubescentibus, petalis interioribus 2.5 cm longis, longissime tenuiter rostratis.

A scandent, sparingly pubescent shrub, the branchlets slender, terete, about 1 mm in diameter, slightly pubescent. Leaves chartaceous, shortly petiolate, oblong to oblong-lanceolate, 17 to 21 cm long, 5 to 7 cm wide, acuminate, base rounded or slightly cordate, the upper surface glabrous, smooth, olivaceous, the lower pale, glaucous, nearly glabrous except for the slightly pubescent brown midrib and nerves; lateral nerves about 20 on each side of the midrib, slender but prominent; petioles pubescent, 2 to 3 mm long. Flowers very narrowly lanceolate, about 7 cm long, solitary, extra-axillary, yellowish, their pedicels slender, filiform, about 3.5 cm long, slightly pubescent, with a single small bract below the middle. Sepals ferruginous-pubescent, oblong, 3 mm long. Outer petals somewhat pubescent, the inflated basal portion about 6 mm wide and long, the very slender beak up to 6 cm in length; inner petals nearly glabrous in the inflated basal parts, 2.5 cm long, the basal part broadly ovate, about 5 mm long, the greatly elongated beak very slender and slightly pubescent.

MINDORO, Pinamalayan, *Bur. Sci. 41108 Ramos*, June 9, 1922. In primary forests at low altitudes.

A species manifestly allied to *Oxymitra filipes* Hook. f. and Th. from which it is at once distinguishable by its much more numerous lateral nerves. It does not appear to be closely allied to any of the hitherto described Philippine forms. It is remote from *O. cuneiformis* Miq.

Genus **UVARIA** Linnæus

Uvaria goloensis sp. nov.

Frutex scandens vel suberectus, minute cinereo-pubescentibus, ramis subatris, glabris, lenticellatis, ramulis densissime subferrugineo-pubescentibus; foliis subcoriaceis, oblongis, usque ad 11 cm longis, obtusis ad late obtuseque acuminatis, basi rotundatis, supra, costa excepta, glabris, subtus minutissime sed molliter stellato-pubescentibus, nervis utrinque circiter 10, tenuibus, patulis, supra admodum distinctis, subtus obsoletis vel subobsoletis; floribus solitariis, pedicellatis, subpurpureis, circiter 1.5 cm diametro, petalis exterioribus late ovatis, puberulis, circiter 9 mm longis, interioribus paullo minoribus; carpellis numerosis, clavatis, 3 mm longis, glabris; fructibus junioribus globosis, glabris.

A scandent or sometimes erect or suberect shrub 1 to 5 m high, the branches nearly black when dry, glabrous, lenticellate, the branchlets very densely pubescent with short, subferruginous indumentum. Leaves oblong, subcoriaceous, usually grayish when dry, scarcely shining, 6 to 11 cm long, 2 to 4 cm wide, obtuse to shortly and broadly obtuse-acuminate, base rounded, the upper surface glabrous except the pubescent midrib, the lower surface minutely and softly stellate-pubescent with short, cinereous hairs; lateral nerves about 10 on each side of the midrib, spreading, sometimes distinct on the upper surface, more often obscure, on the lower surface obsolete or subobsolete; petioles densely pubescent, about 2 mm long. Flowers solitary, about 1.5 cm in diameter, purplish, their pedicels densely pubescent, about 10 mm long, with a single small bract above the middle, elongated and up to 3 cm long in fruit. Sepals reniform, about 4.5 mm wide, 3 mm long, pubescent. Petals broadly ovate, subacute, puberulent, coriaceous, the outer three about 9 mm long, the inner three somewhat smaller and with a broad, very short claw. Stamens numerous, 1.8 to 2 mm long. Carpels numerous, glabrous, clavate, about 3 mm long. Young fruits globose, glabrous, about 5 mm in diameter.

GOLO, *Merrill 11551,* August 14, 1923. On serpentine bluffs near the sea.

Golo is a small island between Lubang and the northeast corner of Mindoro. The present species is very abundant on the peculiar serpentine bluffs along its north coast. On the more open slopes, characterized by the presence of practically bare patches of earth, it forms very dense thickets 1 m high or less, and is here strictly erect. In the neighboring thickets, however, it becomes scandent and attains a height of from 4 to 5 m. It is allied to *Uvaria micrantha* Hook. f. and Th., from which, among numerous other characters, it is at once distinguishable by its indumentum.

RUTACEÆ

Genus **CLAUSENA** Burman

Clausena citriodora sp. nov.

Frutex vel arbor parva, inflorescentiis exceptis glabra, foliis contusis citriodoriferis; ramis subatris, teretibus; foliis 15 ad 20 cm longis, foliolis circiter 7, chartaceis, oblongo-ovatis, 5 ad 8 cm longis, 1.5 ad 3 cm latis, olivaceis, nitidis, integris, perspicue acuminatis, basi acutis, plerumque inaequilateralibus, subtus atropunctatis nervis utrinque 7 ad 9, distinctis; paniculis circiter 10 cm longis, pedunculatis, 3 ad 6 cm latis, adpresse cinereo-puberulis; floribus 5-meris, circiter 4.5 mm longis, ovario glabro, cylindrico.

A shrub or small tree, glabrous except the cinereous-puberulous inflorescences. Branches terete, smooth, nearly black when dry. Leaves 15 to 20 cm long, the leaflets usually 7, chartaceous, olivaceous, shining, oblong-ovate, 5 to 8 cm long, 1.5 to 3 cm wide, entire, prominently acuminate, base inequilateral, acute, the lower surface somewhat paler than the upper, black-punctate; lateral nerves 7 to 9 on each side of the midrib, distinct, somewhat spreading, anastomosing; petiolules 4 to 5 mm long. Inflorescences appressed cinereous-puberulent, about 10 cm long, including the peduncle, 3 to 6 cm wide. Flowers 5-merous, about 4.5 mm long, pedicels 5 mm long. Sepals orbicular-ovate, 1 mm in diameter, glabrous or obscurely puberulent. Petals oblong, glabrous, obtuse, 4.5 mm long, 1.5 mm wide. Stamens 10, glabrous, the alternating longer filaments thickened below, 2.5 mm long, the shorter ones 1.5 mm long; anthers 0.8 to 1 mm long. Ovary glabrous, cylindric, 1.5 mm long; style cylindric, stout, as long as the ovary. Immature fruits ovoid, about 6 mm long.

LEYTE, without definite locality, *Benito Gallardo*, April, 1923. Type in the herbarium, Bureau of Science, cotype in the herbarium of the University of California.

Local name, *biasong*.

A species characterized by being entirely glabrous, except for its cinereous-puberulent inflorescences. It resembles *Clausena anisum-olens* (Blanco) Merr., but has a strong citruslike odor, not at all the aniselike odor of the latter.

Genus **TRIPHASIA** Loureiro

Triphasia grandifolia sp. nov.

Frutex erectus, subglaber, ramis ramulisque teretibus, ramulis puberulis, 1 ad 1.5 mm diametro; foliis 1-foliolatis, foliolis oblongo-ovatis, chartaceis, 5 ad 9 cm longis, acuminatis, basi rotundatis, subtus perspicue glanduloso-punctatis, nervis utrinque circiter 10, patulis, tenuibus, stipulis spiniformibus, rigidis, 5 ad 7 mm longis; floribus axillaribus, solitariis, circiter 1.5 cm longis, calycis 3-lobatis, petalis 3, oblongo-oblanceolatis, staminibus 6.

An erect, nearly glabrous, spiny shrub about 2 m high, the branches and branchlets slender, terete, pale greenish when dry, the branchlets 1 to 1.5 mm in diameter, puberulent. Leaves simple, alternate, chartaceous, oblong-ovate, 5 to 9 cm long, 2.5 to 4.5 cm wide, greenish when dry, the base broadly rounded, narrowed upward to the somewhat acuminate apex, the lower surface paler than the upper and conspicuously glandular-punctate; lateral nerves slender, spreading, about 10 on each side of the midrib; petioles about 3 mm long; stipules spiniform, rigid, stiff, 5 to 7 mm long. Flowers white, solitary, axillary, one between each pair of spinelike stipules, their pedicels about 6 mm long, somewhat thickened upward. Calyx about 4 mm in diameter, the tube 1 to 1.5 mm long, the three broad triangular lobes obtuse to acute, punctate, about 2 mm long. Petals 3, imbricate, glabrous, punctate, oblong-oblanceolate, about 1.5 cm long, 5.5 cm wide. Stamens 6, their filaments narrowly lanceolate, tapering upward, 7 mm long; anthers oblong, 3 mm long. Ovary 3-celled, short-stipitate, oblong, slightly thicker than the stout stipe and style, glabrous, the style 6 mm long; stigma subcapitate. Disk truncate, about 1 mm high. Fruits unknown.

MINDORO, near Pinamalayan, *Bur. Sci. 40822 Ramos,* May 27, 1922. In forest at low altitudes.

Triphasia has hitherto been a monotypic genus, but this second species clearly belongs here, and is strikingly different from the one species hitherto known in its simple, very much larger, entirely differently shaped leaves. *Triphasia trifolia* (Burm. f.) P. Wils. always has much smaller, very differently shaped leaflets, and the leaves are 3-foliolate.

MELIACEÆ

Genus **AMOORA** Roxburgh

Amoora mindorensis sp. nov. § *Pseudogaurea.*

Species *A. cupuliferae* valde affinis, differt calycis multo minoribus, 4 mm diametro et 2 mm longo.

A tree about 8 m high, glabrous except the youngest parts and the inflorescences, the ultimate branches about 1 cm in diameter, glabrous, the growing tips cinereous-puberulent. Leaves alternate, about 60 cm long; leaflets usually 5 pairs, chartaceous, the lower ones much smaller than the median and upper ones, elliptic to elliptic-oblong, the largest 25 to 30 cm long, about 10 cm wide, pale when dry, the lower surface paler than the upper, acuminate, base usually obtuse; lateral nerves 10 to 12 on each side of the midrib, distinct, distant, the reticulations lax, obscure. Panicles about 35 cm long, the primary branches few, scattered, up to 5 cm long, the younger parts appressed pubescent, the older parts nearly glabrous. Flowers white, 5-merous, the pubescent pedicles up to 5 mm long. Calyx shallowly cup-shaped, stipitate, the enlarged part about 2 mm long, truncate, 4 mm in diameter, densely pubescent. Petals 5, lanceolate, thick, reflexed in anthesis, free, densely appressed pubescent externally, glabrous or nearly so within, 2 cm long, 3 to 3.5 cm wide. Staminal tube cylindric, densely appressed pubescent inside and outside, somewhat narrowed near the base, about 1.5 cm long, with five oblong, truncate, 3 to 4 mm long and 2 mm wide apical lobes alternating with five, oblong, pubescent 1 mm long ones. Anthers oblong, 3.5 mm long, alternating with the broad lobes, included. Ovary and style pubescent, about 14 mm long, the style stout, narrowed upward. Disk none.

MINDORO, Pinamalayan, *Bur. Sci. 40860 Ramos*, May 21, 1922. In primary forests at low altitudes.

A species curiously paralleling *Amoora cupulifera* Merr. in general aspect and in most details of its vegetation and inflorescences, differing radically in its very shallowly cup-shaped calyces which are but about 2 mm high and 4 mm in diameter, in contrast to those of *Amoora cupulifera* Merr. which are about 8 mm long and 7 mm in diameter.

Genus **DYSOXYLUM** Blume

Dysoxylum angustifoliolum sp. nov. § *Eudysoxylum*.

Arbor circiter 10 m alta, partibus junioribus inflorescentiisque exceptis glabra vel subglabra; foliis alternis, circiter 50 cm longis, foliolis circiter 23, lanceolatis, chartaceis, usque ad 13 cm longis et 3 cm latis, subcaudato-acuminatis, basi valde inaequilateralibus, glabris vel subtus parcissime pubescentibus; inflorescentiis caulinis, racemosis, racemis pubescentibus, numerosis, fasciculatis, usque ad 6 cm longis; floribus distincte pedicellatis, 4-meris, circiter 6.5 mm longis, calycis cupulatis, pubescentibus, breviter 4-dentatis; petalis oblongis, extus sursum leviter pubescentibus, liberis; tubo cylindrico, 5.5 mm longo, laciniato, extus parce pubescentibus, intus glabris vel subglabris; antheris plerumque 8; ovario pubescente.

A tree about 10 m high, nearly glabrous except the younger parts and the cauline inflorescences. Branches dark colored, terete, glabrous, the branchlets somewhat appressed pubescent. Leaves alternate, about 50 cm long; leaflets about 23, lanceolate, chartaceous, olivaceous, about 13 cm long and 3 cm wide, the apex subcaudate-acuminate, the base very inequilateral, decurrent-acute on both sides, or the broader side subobtuse; lateral nerves about 15 on each side of the midrib, slender, distinct. Racemes 4 to 6 cm long, subferruginous-pubescent, numerous, crowded on large cauline tubercles. Flowers 4-merous, their pubescent pedicels about 3 mm long. Calyx cup-shaped, pubescent, about 2 mm long, 2.5 mm in diameter, shallowly 4-toothed. Petals 4, free, oblong, 6.5 mm long, 2 mm wide, sparingly pubescent externally in the upper part. Staminal tube cylindric, 5.5 mm long, 2 mm in diameter, sparingly pubescent externally, glabrous or subglabrous within, laciniate, the laciniæ usually 8, oblong, somewhat cleft, about 1.2 mm long. Anthers usually 8, about 1 mm long. Disk truncate, 1 mm high. Ovary pubescent; style about 4 mm long, sparingly hirsute.

PALAWAN, *For. Bur. 28910 Cenabre, Baldemor, and Aduviso*, April, 1920. In forests apparently at low altitudes.

Local name, *panablagan* (Tagbanua).

A species manifestly belonging in the same group with *Dysoxylum cauliflorum* Hiern and *D. cumingianum* C. DC., and nearer the former than the latter. Among other characters it is at once distinguishable from both by its much more numerous, much narrower, subcaudate-acuminate, lanceolate leaflets.

Dysoxylum brachybotrys sp. nov. § *Eudysoxylum*.

Arbor subglabra, circiter 10 m alta, foliis alternis, 20 ad 30 cm longis, foliolis 5 vel 7, alternis vel suboppositis, chartaceis ad subcoriaceis, ellipticis ad ovato-ellipticis, acuminatis, in siccitate brunneis ad olivaceis, minute verruculosis, 10 ad 15 cm longis, nervis utrinque 7 ad 9, distinctis; inflorescentiis axillaribus et in axillis defoliatis, brevissimis, racemosis, paucifloris, rhachibus simplicibus, circiter 1 cm longis, incrassatis, cicatricibus multis instructis, paucifloris; floribus 4-meris, breviter pedicellatis, puberulis; petalis extus puberulis, oblongis, circiter 6 mm longis, liberis; tubo cylindrico, glabro, truncato, 5 mm longo; ovario styloque puberulo.

A nearly glabrous tree about 10 m high, the branches terete, glabrous, reddish brown or grayish, the branchlets sometimes puberulent. Leaves alternate, 20 to 30 cm long, the leaflets 5 to 7, alternate or subopposite, chartaceous to subcoriaceous, elliptic to oblong-elliptic, acuminate, when dry brownish to olivaceous, dull or slightly shining, minutely verruculose, 10 to 15 cm long, 5.5 to 7 cm wide; lateral nerves 7 to 9 on each side of the midrib, distinct. Racemes solitary, simple, axillary, and in the axils of fallen leaves, stout, about 1 cm long, the rachis about 2.5 mm in diameter, puberulent and marked by numerous conspicuous scars of fallen pedicels. Flowers few, white, 4-merous, their pedicels 1 to 1.5 mm long, puberulent. Calyx puberulent, shallowly cup-shaped, 4-angled. Petals 4, free, oblong, cinereous-puberulent externally, about 6 mm long, 2.4 mm wide. Staminal tube cylindric, glabrous or nearly so, about 5 mm long, truncate. Anthers 8, included, oblong, 1 mm long. Disk glabrous, about 1 mm high. Ovary and style cinereous-puberulent, the style about 3.5 mm long. Fruit obovoid, rugose when dry, glabrous, about 3.5 cm long.

MINDANAO, Zamboanga District, Malangas, *Bur. Sci. 37012 Ramos and Edaño* (type), November 10, 1919; Ayala, *For. Bur. 26123 Franco,* July, 1916, in fruit; Flecha Point, *Merrill 11632,* September 25, 1922. In primary forests, especially on limestone formations at low altitudes.

A species strongly characterized by its very short, few-flowered, axillary, solitary, stout, conspicuously scarred, simple racemes, which are at most 1 cm in length. The description has been based largely on the type; it is possible that the other two numbers cited represent a distinct but closely allied species.

It is known to the Subanuns as *galum.*

EUPHORBIACEÆ

Genus **GLOCHIDION** Forster

Glochidion lancilimbum sp. nov. § *Euglochidion.*

Arbor parva, glaberrima, ramulis angulatis; foliis lanceolatis, chartaceis, subolivaceis, usque ad 7 cm longis et 2 cm latis, nitidis, obtuse acuminatis, basi inaequilateralibus, subacutis, nervis utrinque 7 ad 9, perspicuis; floribus fasciculatis, ♂ paucis, antheris plerumque 5, 1 mm longis, ♀ numerosis, breviter (2 mm) pedicellatis; sepalis exterioribus oblongo-ovatis ad oblongis, obscure acuminatis, 1.5 mm longis, interioribus minoribus; ovario globoso, glabro; stylis crassis, cylindraceis, integris, rotundato-

truncatis, circiter 1 mm longis, deorsum paullo attenuatis; fructibus depresso-globosis, circiter 6 mm diametro; seminibus plerumque 10.

A small, entirely glabrous tree about 5 m high, the branches terete, brownish, the branchlets more or less angled, 1 to 2 mm in diameter. Leaves numerous, lanceolate, subolivaceous, shining, firmly chartaceous, 6 to 7. cm long, 1.5 to 2 cm wide, of about the same color on both surfaces, narrowed upward to the obtusely acuminate apex, the base inequilateral, subacute; lateral nerves 7 to 9 on each side of the midrib, prominent, curved, obscurely anastomosing close to the margin, the reticulations distinct but not prominent; petioles about 4 mm long. Flowers in axillary fascicles, the staminate ones few, their sepals elliptic, 1.5 to 1.7 mm long, the inner ones smaller than the outer; anthers usually 5, about 1 mm long. Pistillate flowers numerous, their pedicels about 2 mm long. Sepals oblong-ovate to oblong, obscurely acuminate, about 1.5 mm long, the inner ones smaller. Ovary globose, glabrous; style stout, cylindric, truncate-rounded, entire, about 1 mm long, slightly narrowed below, nearly as thick as the ovary. Fruits depressed-globose, about 6 mm in diameter; seeds usually 10.

MINDANAO, Zamboanga District, Malangas, *Bur. Sci. 37401 Ramos and Edaño,* November 2, 1919. Along small streams at low altitudes in secondary forests and in deserted clearings.

A species belonging in the same group with *Glochidion lancifolium* C. B. Rob., readily distinguishable, among other characters, by its much smaller leaves.

Glochidion cenabrei sp. nov. § *Euglochidion.*

Arbor circiter 10 m alta, glaberrima; foliis chartaceis, subolivaceis, oblongo-ellipticis ad oblongo-ovatis, leviter acuminatis, basi subrotundatis, plerumque leviter inaequilateralibus, usque ad 15 cm longis, nervis utrinque circiter 6, distinctis; inflorescentiis axillaribus, breviter pedunculatis, floribus subumbellatim dispositis, breviter (3 ad 4 mm) pedicellatis, pedunculo 3 ad 7 mm longo; floribus ♂ paucis, sepalis circiter 1.5 mm longis, antheris 5, connatis, circiter 1 mm longis; ♀ numerosis, sepalis ellipticis, 2 ad 2.5 mm longis, interioribus minoribus; ovario glabro, stylis cylindraceis, rotundato-truncatis, 1 mm longis, deorsum haud angustatis.

An entirely glabrous tree about 10 m high, the branches and branchlets smooth, usually dark brown when dry, the former terete, the latter somewhat angled. Leaves chartaceous, oblong-

elliptic to oblong-ovate, 10 to 15 cm long, 4 to 6 cm wide, somewhat acuminate, base subrounded, usually slightly inequilateral, usually olivaceous when dry, slightly shining; lateral nerves about 6 on each side of the midrib, slender, distinct, anastomosing, curved, the reticulations rather lax; petioles about 6 mm long; stipules lanceolate, acuminate, about 3 mm long. Inflorescences axillary, solitary, shortly peduncled, the flowers subumbellately arranged, the peduncles 3 to 7 mm long. Male flowers few, their sepals elliptic to elliptic-ovate, rounded, 1.5 mm long, the inner smaller; anthers usually 5, united in a globose or ellipsoid mass about 1 mm long. Pistillate flowers numerous, their pedicels 3 to 4 mm long. Outer sepals elliptic, 2 to 2.5 mm long, 1.2 to 1.4 mm wide, obtuse to acute, the inner ones oblong, 2 mm long, 1 mm wide. Ovary subglobose, glabrous; style cylindric, truncate-rounded, entire, 1 mm long, nearly as thick as the ovary, not constricted or narrowed below. Fruit unknown.

PALAWAN, near Puerto Princesa, *For. Bur. 29174 Cenabre*, January 26, 1923. Along small streams in forests at low altitudes.

A species well characterized among the Philippine forms by its peduncled inflorescences, the flowers being subumbellately arranged rather than strictly fascicled. In this respect, as well as in its vegetative characters, it approaches the Bornean *Glochidion pedunculatum* Merr. which, however, has pubescent ovaries and much longer styles.

Glochidion woodii sp. nov. § *Hemiglochidion.*

Frutex glaberrimus, 3 ad 4 m altus; foliis chartaceis ad subcoriaceis, oblongo-ovatis, usque ad 20 cm longis, obtusis ad late obtuseque acuminatis, basi plerumque late rotundatis, nervis utrinque circiter 8, perspicuis; floribus fasciculatis, ♂ paucis, tenuiter pedicellatis, sepalis 2 mm longis, exterioribus anguste ellipticis ad oblongo-ellipticis, interioribus paullo minoribus, anguste oblongo-obovatis; antheris 3; ♀ numerosis, breviter (1 ad 2 mm) pedicellatis, sepalis lanceolatis, 22 mm longis; ovario glabro, globoso, 1 mm diametro; stylis cylindraceis, crassis, glabris, 3 ad 3.5 mm longis, minute crenulatis; fructibus subdepresso-globosis, sulcatis, circiter 1.5 cm diametro, 6-locellatis.

An entirely glabrous shrub 3 to 4 m high, with greatly elongated, more or less pendulous branchlets, the branches pale, terete, the branchlets usually purplish, more or less angled. Leaves chartaceous to subcoriaceous, oblong-ovate, olivaceous or brownish when dry, shining, 12 to 20 cm long, 5 to 8 cm wide, obtuse to broadly obtuse-acuminate, base mostly broadly rounded, often somewhat inequilateral; lateral nerves about 8 on each side of the midrib, prominent, curved-anastomosing, the reticulations rather lax; petioles 2 to 3 mm long; stipules oblong-ovate, about 2 mm long. Flowers axillary, fascicled, the staminate ones usually few, their slender pedicels up to 1.5 mm long; sepals glabrous, the outer ones oblong-elliptic to narrowly elliptic, 2 mm long, obtuse, the inner ones somewhat smaller, narrowly oblong-obovate. Anthers 3, 1.2 mm long. Pistillate flowers numerous, their pedicels stout, 1 to 2 mm long. Sepals lanceolate, 2 mm long. Ovary globose, glabrous, about 1 mm in diameter; style stout, cylindric, 3 to 3.5 mm long, nearly as thick as the ovary, not constricted below, apex minutely crenate-lobed. Fruits usually pink, subdepressed-globose, 6-celled, about 1.5 cm in diameter, the pericarp somewhat reticulate.

MINDANAO, Misamis Province, *For. Bur. 11888 Miranda, Piper 80, 81:* Lanao District, *Clemens 302, s. n.:* Zamboanga District, *Bur. Sci. 37334 Ramos and Edaño:* Davao District, *Merrill 11613* (type), *Piper 430, Bur. Sci. 15843 Fénix, For. Bur. 28321 Fernando, 28195 Elumir.* In thickets at low altitudes, ascending to 700 meters.

This species is manifestly allied to *Glochidion trichogynum* Muell.-Arg., but is at once distinguishable by its entirely glabrous ovaries and styles; most of the specimens cited above have been referred to the latter species, and the duplicates so distributed. The type is from Mati, Davao District.

Genus **PHYLLANTHUS** Linnæus

Phyllanthus anisophyllaeoides sp. nov.

Frutex erectus, glaber, circiter 0.6 m alta, ramis ramulisque tenuibus; foliis numerosis, distichis, falcato-trapezoideis, circiter 12 mm longis et 4.5 mm latis, acute-acuminatis, basi acutis, valde obliquis, nervis utrinque circiter 10, tenuibus, obscuris, obliquis; floribus ♀ paucis, breviter pedicellatis, solitariis, sepalis lanceolatis, circiter 2 mm longis; ovario ovoideo, glabro, stylis cylindraceis, truncatis, 2 mm longis; fructibus circiter 8 mm diametro.

An erect, glabrous, branched shrub about 0.6 m high, the stems, branches, and branchlets slender, brownish, the branches terete, the ultimate branchlets solitary or somewhat fascicled, 10 to 17 cm long, about 0.7 mm in diameter, somewhat angled.

Leaves sessile, distichous, 40 to 60 on each ultimate branchlet, closely arranged, falcate-trapezoidal, about 12 mm long and 4.5 mm wide, chartaceous, olivaceous, somewhat paler beneath, oblique, the apex acutely acuminate, the base very oblique, acute, the midrib slender, diagonal, the lateral nerves slender, obscure, about 10 on each side of the midrib, obliquely ascending; stipules ovate-lanceolate, acuminate, less than 1 mm long. Pistillate flowers axillary, solitary, few, very shortly pedicelled; sepals lanceolate, acuminate, 2 mm long. Ovary narrowly ovoid, glabrous; style cylindric, truncate, 2 mm long. Capsules about 8 mm in diameter, the valves oblong, somewhat twisted, smooth, shining, crustaceous.

MINDORO, Mount Halcon, *Bur. Sci. 40585 Ramos and Edaño*, March 10, 1922. On forested slopes, altitude about 1,000 meters.

A strongly marked species, its vegetative characters closely simulating those of certain small-leaved forms of the rhizophoraceous genus *Anisophyllaea*. Among the numerous Philippine forms the only one known which is at all similar to the present one is *Phyllanthus buxifolius* Muell.-Arg., from which *P. anisophyllaeoides* differs in numerous characters, notably in its sharply acuminate, conspicuously falcate leaves.

CELASTRACEÆ

Genus **GLYPTOPETALUM** Thwaites

Glyptopetalum palawanense sp. nov.

Arbor glabra, circiter 5 m alta, ramis teretibus, laevis, ramulis plus minusve compressis; foliis coriaceis, obovatis ad elliptico-obovatis, in siccitate pallidis, nitidis, laevis, 9 ad 14 cm longis, apice rotundatis ad obtusis, basi acutis, nervis utrinque circiter 7, tenuibus, haud perspicuis, margine obscurissime distanter undulato-crenulatis vel integris; cymis axillaribus, pedunculatis, paucifloris, 5 ad 7 cm longis; fructibus in siccitate pallidis, globosis ad depresso-globosis, 1- ad 4-locellatis, laevis, 8 ad 12 mm diametro, sepalis persistentibus 4, coriaceis.

A glabrous tree about 5 m high, the branches and branchlets pale or pale olivaceous, smooth, the former terete, the latter more or less compressed. Leaves coriaceous, shining, smooth, obovate to elliptic-obovate, 9 to 14 cm long, 6 to 8 cm wide, the apex rounded to obtuse, base acute, margin entire or in the upper part distantly and obscurely undulate-crenulate; lateral nerves about 7 on each side of the midrib, slender, not prominent, ascending, very obscurely anastomosing, the primary reticulations very lax, indistinct, the secondary ones obsolete; petioles about 1 cm long. Cymes axillary, peduncled, few-flowered, 5 to 7 cm long, in fruit up to 5 cm wide. Flowers not seen, the persistent sepals 4, coriaceous. Fruits globose to depressed-globose, 1- to 4-celled, the 3- and 4-celled ones usually with broadly rounded angles, pale when dry, smooth, 8 to 12 mm in diameter, each cell with a single seed.

PALAWAN, near Puerto Princesa, *For. Bur. 29181 Cenabre*, December 27, 1922. In primary forests at low altitudes.

The local Tagbanua name is *panablayan*.

The present species is somewhat allied to the Luzon *Glyptopetalum loheri* Merr., from which it differs radically in its larger, rounded to obtuse, not acuminate leaves and in its long peduncled cymes.

ICACINACEÆ

Genus **MAPPIA** Jacquin

Mappia philippinensis sp. nov.

Arbor circiter 5 m alta, inflorescentiis exceptis glabra, ramulis in siccitate atris; foliis chartaceis, oblongo-ellipticis, 7 ad 10 cm longis, breviter acuminatis, basi acutis, nervis utrinque circiter 6, tenuibus; inflorescentiis laxis, terminalibus, leviter pubescentibus, circiter 8 cm longis; calycis brevissime 5-lobatis, circiter 1.3 mm diametro; petalis lanceolatis, liberis, 4 mm longis, utrinque glabris; filamentis 2 mm longis, sursum angustatis, antheris oblongis, 3 mm longis; ovario leviter adpresse pubescente, stylis glabris, 2 mm longis.

A small tree about 5 m high, glabrous except the sparingly pubescent inflorescences, the branches terete, dark-colored, sparingly lenticellate, the branchlets slender, nearly black when dry. Leaves chartaceous, blackish and somewhat shining when dry, oblong-elliptic, 7 to 10 cm long, 3 to 4 cm wide, apex shortly acuminate, base acute; lateral nerves slender, about 6 on each side of the midrib, rather distinct, the reticulations lax; petioles 1 to 1.5 cm long. Inflorescences terminal, lax, sparingly appressed pubescent, about 6 mm long, many-flowered, most of the flowers deciduous. Calyx 1 to 1.5 mm in diameter, shallowly 5-lobed, margins slightly pubescent. Petals 5, lanceolate, free, 4 mm long, glabrous on both surfaces. Filaments 2 mm long, narrowed upward; anthers oblong, 3 mm long, deeply cleft at the base. Ovary ovoid, sparingly appressed pubescent, 1-celled; style glabrous, 2 mm long.

MINDANAO, Bukidnon Subprovince, near Tangkulan, *Bur. Sci. 24941 Fénix,* July 10, 1916. On steep slopes near streams, the flowers yellow, fragrant.

This is the first representative of the genus to be recorded from the Philippines; it differs from the other described forms of *Mappia* in its petals being glabrous within. In all essentials, however, the characters of the present species conform to those of *Mappia*, and I feel convinced that the indicated generic disposition of it is correct. The duplicates were distributed as an undetermined representative of the Icacinaceæ.

AQUIFOLIACEÆ

Genus **ILEX** Linnæus

Ilex permicrophylla sp. nov.

Frutex vel arbor parva ramulis pedicellisque puberulis; foliis numerosis, parvis, integris, coriaceis, ellipticis, 1 ad 1.5 cm longis, utrinque acutis, in siccitate pallidis, glabris, nervis utrinque 5 vel 7, patulis, valde obscuris vel obsoletis; fructibus axillaribus, solitariis, globosis, breviter pedicellatis, glabris, 2 ad 2.5 mm diametro, seminibus 3 vel 4, sepalis persistentibus 4 vel 5.

A shrub or small tree 3 to 4 m high, the branchlets and pedicels minutely cinereous-puberulent, the branches gray, terete, glabrous, the ultimate branchlets numerous, about 1 mm in diameter. Leaves very numerous, coriaceous, crowded, entire, pale when dry, elliptic, acute at both ends, 1 to 1.5 cm long, 5 to 7 mm wide, the midrib prominent, the lateral nerves obsolete, or when present slender, obscure, spreading, 5 to 7 on each side of the midrib; petioles 1 to 1.5 mm long. Flowers axillary, solitary, 4- or 5-merous, their pedicels puberulent, 2 to 3 mm long in fruit, bibracteolate. Fruits globose, glabrous, 2 to 2.5 mm in diameter, 3- or 4-seeded, the persistent calyx puberulent, about 2 mm in diameter.

LUZON, Benguet Subprovince, Mount Baudan, and between Mankayan and Baguio, *Bur. Sci. 40311* (type), *40516 Ramos and Edaño,* September and October, 1921. In the mossy forest, altitude about 2,100 meters.

A species curiously like the Formosan *Ilex parvifolia* Hayata but with entire, much thicker leaves while the branchlets are merely cinereous-puberulent, not ferruginous-tomentose. Its closest ally is *I. hanceana* Maxim., from which the Philippine *I. fletcheri* Merr. may prove to be not specifically distinct.

SAPINDACEÆ

Genus **ALLOPHYLUS** Linnæus

Allophylus lopezii sp. nov.

Frutex circiter 2 m altus, inflorescentiis partibusque junioribus exceptis glaber, ramis teretibus, pallidis, laevis, glabris, ramulis parcissime adpresse pubescentibus; foliis 1-foliolatis, anguste oblongo-obovatis, ad late oblongo-oblanceolatis, usque ad 25 cm longis, breviter acuminatis, basi acutis ad obtusis, integris vel obscure et valde distanter denticulatis, supra olivaceis, nitidis, subtus pallidioribus, axillis barbatis, nervis utrinque circiter 10, perspicuis; petiolo 2 ad 2.5 cm longo; inflorescentiis axillaribus, solitariis, 3 ad 5 cm longis, multifloris, racemiformis, leviter pubescentibus; floribus mediocris, circiter 3.5 mm diametro, sepalis glabris, majoribus orbicularis, 1.5 ad 2 mm diametro, minoribus oblongo-obovatis; petalis oblongo-obovatis, 1.4 mm longis, margine perspicue ciliatis; fructibus junioribus leviter adpresse pubescentibus.

A shrub about 2 m high, nearly glabrous, the branches terete, smooth, obscurely lenticillate, pale grayish, glabrous, the growing tips slightly pubescent. Leaves 1-foliolate, firmly chartaceous, olivaceous, shining, narrowly oblong-obovate to broadly oblong-oblanceolate, 18 to 25 cm long, 6.5 to 9 cm wide, acuminate, base acute to obtuse, entire, or an occasional minute tooth at the end of the lateral nerves in the upper part, the lower surface paler than the upper and bearded in the axils; lateral nerves about 10 on each side of the midrib, very prominent on the lower surface, spreading, arched-anastomosing, distant; petioles 2 to 2.5 cm long, glabrous or nearly so. Inflorescences axillary, solitary, simple, racemiform, 3 to 5 cm long, sparingly pubescent, the flowers fascicled at the nodes, numerous, somewhat crowded, about 3.5 mm in diameter, their pedicels 1 to 1.5 mm long. Sepals glabrous, the larger ones orbicular, 1.5 to 2 mm in diameter, the smaller ones oblong-obovate. Petals 4, oblong-obovate, somewhat expanded at their apices, truncate or slightly retuse, the margins densely ciliate. Filaments 1.5 to 2 mm long. Very young fruits sparingly appressed-pubescent.

BUSUANGA, Langbuan, *Bur. Sci. 41387 Lopez,* September 12, 1922. On forested slopes at low altitudes.

A species closely allied to *Allophylus brevipetiolatus* Radlk. but readily distinguished, among other characters, by its much longer petioles.

ELAEOCARPACEÆ

Genus **ELAEOCARPUS** Linnæus

Elaeocarpus halconensis sp. nov.

Arbor parva, glabra, ramis ramulisque teretibus, ramulis tenuibus; foliis subverticillatis, confertis, oblongo-ellipticis ad oblanceolatis, usque ad 4.5 cm longis, obtuse acuminatis, basi cuneatis, integris, breviter petiolatis, nervis utrinque circiter 4, obscuris; racemis tenuibus, brevibus, paucifloris, floribus longe tenuiter pedicellatis; sepalis oblongo-ellipticis, obtusis, basi intus pilosis; petalis obovatis, 7 ad 8 mm longis, deorsum angustatis, basi intus pilosis exceptis glabris, laciniis 10 ad 12, lanceolatis, acuminatis, 1 ad 2 mm longis; antheris oblongis; ovario glabro.

A small tree about 4 m high, glabrous except the basal parts of the petals and sepals inside. Branches and branchlets terete, slender, brownish. Leaves subverticillately crowded at the tips of the branchlets, chartaceous, greenish olivaceous, oblong-elliptic to oblanceolate, entire, obtusely acuminate, base cuneate, 2 to 4 cm long, 7 to 10 mm wide; lateral nerves slender, obscure, about 4 on each side of the midrib; petioles 2 to 3 mm long. Racemes few-flowered, axillary, glabrous, slender, the rachis about 1 cm long, the pedicels almost filiform, up to 12 mm long. Sepals oblong-elliptic, glabrous except at the pilose base inside, or the margins sometimes slightly pubescent, obtuse, 8 mm long. Petals obovate, entirely glabrous except at the pilose base inside, 7 to 8 mm long, 5 to 6 mm wide, narrowed below to the cuneate-obtuse base, the apex truncately rounded, divided into 10 to 12 lanceolate, acuminate, 1 to 2 mm long segments. Stamens 15 to 20; anthers oblong, obtuse, inappendiculate, equaling the filaments. Torus villous. Ovary and style glabrous.

MINDORO, Mount Halcon, *Bur. Sci. 40583 Ramos and Edaño,* March 9, 1922. On forested slopes, altitude about 1,000 meters.

A species closely allied to *Elaeocarpus verticillatus* Elm., from which it is at once distinguished by its much smaller, entire leaves.

DILLENIACEÆ

Genus **SAURAUIA** Willdenow

Saurauia zamboangensis sp. nov.

Frutex circiter 2 m altus, ramulis et subtus foliis ad costa nervisque perspicue adpresse setosis; foliis lanceolatis, usque ad 26 cm longis et 6 cm latis, supra glabris, chartaceis, tenuiter subcaudato-acuminatis, basi acutis vel subacutis, nervis utrinque circiter 12, perspicuis; inflorescentiis caulinis, floribus dense fasciculatis, longe pedicellatis, pedicellis hirsutis, 1.5 ad 2 cm longis; sepalis oblongis, 6 mm longis, extus parce ciliato-setosis; stylis 3, circiter 3.5 mm longis, deorsum (1 ad 1.5 mm) connatis.

A shrub about 2 mm high, the branchlets slender, appressed-setose, the stiff setæ narrowly lanceolate, acuminate, about 3 mm long, similar ones on the midrib and nerves on the lower surface of the leaves. Leaves lanceolate, chartaceous, 20 to 26 cm long, 4 to 6 cm wide, subequally narrowed to the slender, subcaudate-acuminate apex and below to the acute or subacute base, the upper surface subolivaceous, glabrous, the lower pale brownish, conspicuously appressed-setose on the midrib and nerves, otherwise sparingly ciliate-pubescent, the margins distinctly spinulose-toothed; lateral nerves about 12 on each side of the midrib, prominent on the lower surface, curved-ascending; petioles 2 to 2.5 cm long, appressed-setose. Inflorescences cauline, the flowers densely fascicled on woody tubercles, not at all cymose, up to 50 or more in a fascicle, their pedicels slender, hirsute, 1.5 to 2 cm long. Sepals sparingly ciliate-setose, oblong, 6 mm long. Styles 3, about 3.5 mm long, united for the lower 1 to 1.5 mm.

MINDANAO, Zamboanga District, *Bur. Sci. 36607 Ramos and Edaño,* October 30, 1919. In forests on Mount Tubuan, altitude about 500 meters.

Known to the Subanuns as *sasaua.*

A very strongly marked species strikingly differentiated from the numerous hitherto known Philippine forms by its lanceolate, slenderly subcaudate-acuminate leaves which are glabrous on the upper surface and conspicuously appressed-setose on the midrib and nerves beneath and also more or less pubescent; but more especially characterized by its long-pedicelled, densely fascicled flowers which are borne on tubercles on the trunk.

GUTTIFERÆ

Genus **GARCINIA** Linnæus

Garcinia busuangaensis sp. nov. § *Oxycarpus.*

Arbor parva, glabra, ramis teretibus, ramulis ultimis plus minusve compressis, circiter 2 mm diametro; foliis coriaceis, ellipticis ad oblongo-ellipticis, in siccitate brunneo-olivaceis, nitidis, utrinque concoloribus, usque ad 15 cm longis, utrinque subaequaliter angustatis basi acutis, apice obtuse acuminatis, vix punctatis, nervis utrinque circiter 25, tenuibus, haud conspicuis; floribus ♂ 4-meris, axillaribus, binis vel depauperato-cymosis; petalis late ellipticis, 8 mm longis, concavis; phalangibus 4, compressis, late obovatis ad suborbicularibus, circiter 5 mm longis, intus antheris numerosis ellipsoideis sessilibus circiter 0.7 mm longis obtectis, extus nudis, antheris poro centrali dehiscentibus; ovarii rudimento crasso, subcylindrico, truncato, 4 mm longo.

A glabrous tree about 5 m high, the branches terete, dark brown when dry, the ultimate branchlets more or less compressed, about 2 mm in diameter. Leaves coriaceous, elliptic to oblong-elliptic, brownish olivaceous, somewhat shining, and of the same color on both surfaces when dry, 12 to 15 cm long, 5 to 7 cm wide, subequally narrowed to the acute base and to the blunt-acuminate apex, eglandular; lateral nerves slender, indistinct, about 25 on each side of the midrib, the reticulations nearly obsolete; petioles about 1 cm long. Staminate flowers axillary, in pairs, or in greatly depauperate cymes, their pedicels stout, 4-angled, about 5 mm long. Outer sepals reniform, coriaceous, about 2.5 mm long, the inner two broadly obovate, concave, petaloid, 6 mm long. Petals broadly elliptic, concave, 8 mm long. Phalanges 4, flattened, broadly obovate to suborbicular, about 5 mm long, the inner face rather densely covered by the numerous, sessile, ellipsoid, 0.5 to 0.8 mm long anthers, the anthers opening by a central slit or pore, the backs of the phalanges naked except near the upper margin. Rudimentary ovary subcylindric or somewhat angled, truncate, about 4 mm long, 3.5 mm in diameter.

CALAMIAN ISLANDS, Busuanga, *Bur. Sci. 41243 Ramos*, September 12, 1922. In dry forests at low altitudes.

A strongly marked species in its staminal phalanges being flattened, broadly obovate, and densely covered on the inner face with the numerous sessile, ellipsoid, centrally dehiscent anthers, the backs of the phalanges being naked. In vegetative characters it rather strongly resembles *Garcinia rhizophoroides* Elm., but differs widely in its floral characters.

Garcinia pacifica sp. nov. § *Hebradendron.*

Arbor parva, glabra, ramis teretibus, ramulis subangulatis vel sulcatis, circiter 2.5 mm diametro; foliis subcoriaceis, oblongo-ellipticis ad oblongo-obovatis, usque ad 11 cm longis, breviter obtuse acuminatis, basi acutis, opacis, subtus pallidis, haud punctatis; nervis lateralibus tenuibus, obscuris, utrinque circiter 20; floribus ♂ axillaribus, solitariis, sessilibus, 4-meris, sepalis majoribus suborbicularis, circiter 4 mm latis; petalis oblongis, obtusis, 10 mm longis, 4 mm latis; ovario rudimento 0; staminibus numerosis, confertis, anguste oblongis, 2.5 mm longis, compressis, antheris marginalibus, elongatis, interruptis.

A small glabrous tree about 5 m high, the branches terete, grayish, the branchlets angled or sulcate, about 2.5 mm in diameter. Leaves subcoriaceous, oblong-elliptic to oblong-obovate, brown when dry, scarcely shining, paler beneath, 9 to 11 cm long, 4 to 5 cm wide, the apex shortly and obtusely acuminate, base acute; lateral nerves about 20 on each side of the midrib, very slender, obscure; petioles about 1 cm long. Male flowers axillary, solitary, 4-merous, sessile. Inner two sepals suborbicular, rounded, about 3 mm long, 4 mm wide, the outer two smaller. Petals 4, oblong, 1 cm long, 4 mm wide, rounded. Rudimentary ovary none. Stamens numerous, flattened, about 2.5 mm long, narrowly oblong, arranged in a somewhat hemispheric mass but free, the anther cells elongated, marginal, more or less interrupted.

LUZON, Tayabas Province, Mount Binuang, *Bur. Sci. 28649 Ramos and Edaño,* May 28, 1917. On damp forested slopes, altitude about 300 meters.

The alliances of this species are not clear. It is very strongly characterized by its narrowly oblong, flattened, free stamens, the elongated anther cells being more or less interrupted and marginal. The leaves strongly resemble those of some species of the celastraceous genus *Microtropis.*

Garcinia ituman sp. nov. § *Eugarcinia.*

Arbor 5 ad 15 m alta, glabra, ramis ramulisque teretibus, ramulis viridis, 2 ad 3 mm diametro, laevis; foliis coriaceis, ovatis ad elliptico-ovatis, acuminatis, basi plerumque rotundatis, usque ad 12 cm longis, nervis primariis utrinque circiter 9, distinctis; floribus ♂ 4-meris, fasciculato-cymosis, confertis, parvis, petalis 4.5 mm longis; antheris confertis, numerosis, 2-locellatis, vix in phalangibus dispositis, pistilli rudimento fungiforme.

A glabrous tree 5 to 15 m high, the branches and branchlets terete, the branches pale or brownish, the branchlets greenish, 2 to 3 mm in diameter. Leaves coriaceous, ovate to elliptic-ovate, 7 to 12 cm long, 4 to 6.5 cm wide, base usually broadly rounded, apex acuminate, when dry olivaceous, somewhat shining, usually paler beneath; primary lateral nerves about 9 on each side of the midrib, prominent, anastomosing, the reticulations distinct; petioles about 1 cm long. Staminate inflorescences axillary, 1 cm in diameter or less, composed of rather numerous, crowded fasciculate-cymose flowers. The outer two sepals suborbicular, 2 mm long, the inner two subreniform, 2.5 mm long, 3 mm wide. Petals 4, elliptic to obovate, about 4.5 mm long. Anthers numerous, crowded, ellipsoid, 2-celled, arranged in a somewhat cup-shaped mass surrounding the rudimentary ovary, scarcely in phalanges, each short ultimate division of the anther-bearing body bearing 1 or 2 cells. Rudimentary ovary fungiform, the stipe about 1.5 mm long, the head truncate-rounded, about 1.2 mm in diameter.

MINDORO (Tambarong Island), *For. Bur. 25623 Medina* (sterile). AMBIL, *For. Bur. 22538 Mariano.* PANAY, Capiz Province, *Bur. Sci. 35654 Martelino and Edaño,* June 20, 1919 (type). BOHOL, *For. Bur. 27056 Hirro* (sterile). On rocky slopes in thin forests, especially on limestone formations from sea level to an altitude of 600 meters.

In southern Mindoro the species is known as *harras,* and in Bohol as *ituman.*

The wood is hard and durable and is locally very popular for use as house posts on account of its resistance to decay. The species is a strongly marked one; in its vegetative characters it is widely different from any other form known to me, while its anthers are densely crowded in a shortly branched and rebranched cup-shaped mass surrounding the fungiform pistillode, not in distinct phalanges.

Garcinia whitfordii sp. nov. § *Discostigma.*

Arbor glabra, circiter 12 m alta, ramis ramulisque teretibus, ramulis circiter 2 mm diametro; foliis subcoriaceis, elliptico-ovatis ad oblongo-ellipticis, acuminatis, 13 ad 17 cm longis, usque ad 7.5 cm latis, subtus obscure punctatis; nervis primariis utrinque circiter 12, subtus valde perspicuis, reticulis distinctis vel indistinctis; inflorescentiis axillaribus, depauperato-cymosis, paucifloris, 1.5 ad 3 cm longis; floribus 4-meris, sepalis circiter 2 mm longis; antheris numerosis, minutis, in phalangibus dense confertis; pistilli rudimento fungiforme, 1.2 mm diametro.

A glabrous tree about 12 m high, the branches and branchlets terete, the latter slender, about 2 mm in diameter. Leaves subcoriaceous, elliptic-ovate to oblong-elliptic, 13 to 17 cm long, 5 to 7.5 cm wide, the apex shortly acuminate, base broadly acute, olivaceous and somewhat shining when dry, somewhat punctate-glandular, the lower surface paler than the upper; primary lateral nerves about 12 on each side of the midrib, usually impressed on the upper surface, very prominent beneath, curved-anastomosing, the alternating secondary ones often distinct, not reaching the margin, the reticulations obscure to rather distinct, irregular; petioles 1 to 1.5 cm long. Inflorescences axillary, rather few-flowered, depauperate-cymose, 1.5 to 3 cm long. Flowers 4-merous, the staminate ones in bud globose. Anthers numerous, minute, sessile, crowded on all sides of the 1.5 mm long obovoid phalanges; rudimentary ovary fungiform, shortly stipitate, hemispheric, 1.2 mm in diameter. Pistillate flowers in size similar to the staminate ones, the outer two sepals 1 to 1.5 mm long, ovate. Petals orbicular to subelliptic, 3 mm long, concave, rounded. Stigma depressed-globose, 3 mm in diameter, entire. Staminodes 0.

MINDANAO, Zamboanga District, Port Banga and Tigui, *For. Bur. 9142 Whitford and Hutchinson,* December, 1907; *For. Bur. 22784 Miranda,* July, 1914. In dipterocarp forests at low altitudes.

Among the Philippine species most closely allied to *Garcinia luzoniensis* Merr., but totally different from it. The prominent primary nerves which are more or less impressed on the upper surface are characteristic.

DIPTEROCARPACEÆ

Genus **SHOREA** Roxburgh

Shorea kalunti sp. nov. § *Anthoshorea.*

Arbor alta, inflorescentiis dense cinereo-pubescentibus exceptis glabra, ramis ramulisque lenticellatis; foliis ovatis ad oblongo-ovatis vel elliptico-ovatis, coriaceis, pallide olivaceis, nitidis, usque ad 10 cm longis, obtuse-acuminatis, basi subacutis ad subrotundatis, nervis utrinque circiter 7, distinctis, reticulis laxis, indistinctis; inflorescentiis 2.5 ad 4 cm longis, dense cinereopubescentibus; floribus circiter 7 mm longis, petalis oblongis, contortis, obtusis; antheris 15, 0.2 mm longis, appendicibus filiformibus, 0.3 mm longis, glabris; ovario deorsum glabro, sursum pubescente, stylopodium 0; fructibus junioribus oblongo-ovoideis, dense pubescentibus, calycis segmentis sub fructu oblanceolatis ad subspatulatis, circiter 8 mm latis, 3 majoribus usque ad 5 cm longis.

A tree about 50 m high, glabrous except the densely cinereous-pubescent inflorescences. Branches and branchlets terete, glabrous, with numerous small lenticels, usually dark brown when dry. Leaves coriaceous, smooth, shining, ovate to oblong-ovate or elliptic-ovate, pale olivaceous or sometimes greenish when dry, about the same color on both surfaces, 7 to 10 cm long, 3.5 to 5 cm wide, narrowed upward to the obtusely acuminate apex, the base subobtuse to rounded; lateral nerves about 7 on each side of the midrib, slender, distinct, the reticulations lax, not prominent; petioles 6 to 10 mm long, glabrous. Inflorescences axillary, densely and softly cinereous-pubescent with short hairs, the flowers falcately arranged on the ultimate branchlets. Flowers about 7 mm long, their pedicels stout, about 1 mm long. Sepals elliptic-ovate, obtuse, 2 mm long, densely pubescent. Petals oblong, 6 mm long, about 2 mm wide, obtuse, densely pubescent externally, twisted in anthesis. Stamens 15, the minute anthers globose to ellipsoid, 0.2 mm long, the apical appendage 0.3 mm long, slender, glabrous. Ovary glabrous below, minutely pubescent above; style pubescent, less than 1 mm long; stylopodium none. Young fruits oblong-ovoid, about 1 cm long, pubescent, the accrescent sepals in fruit 5, oblanceolate to spatulate, rounded, about 8 mm wide, more or less pubescent, much narrowed below, the three longer ones up to 5 cm in length, the two shorter ones nearly as long.

MINDANAO, Zamboanga, Lanao, and Davao Districts, *For. Bur. 27701 Angeles and Selorio* (type), *13294, 13902 Foxworthy, Demesa, and Villamil*, the former in flower, April 30, 1919, the latter two with immature fruits, May and June, 1912. There are also seven sterile specimens that I refer here, *For. Bur. 27182 Jimenez, 9076, 9130, 9372 Whitford and Hutchinson, 13289 Foxworthy, Demesa, and Villamil, 23840, 21868 Villamil.* In primary forests at low altitudes.

The specimens have long been placed with *Shorea mindanensis* Foxw., as possibly representing a form of that species. It is, however, very different from Foxworthy's species and curiously resembles flowering specimens of *Shorea gibbosa* Brandis, of the Malay Peninsula; it is distinguished from *Shorea mindanensis* Foxw. by its vegetative and fruit characters as well as by its lenticellate branches and branchlets. From *Shorea gibbosa* Brandis it is at once distinguished by its fewer stamens, very much shorter appendages to its anthers, and its very short styles.

It is widely known in southern Mindanao as *kalunti*, whence its specific name.

BEGONIACEÆ

Genus **BEGONIA** Linnæus

Begonia angilogensis sp. nov.

Erecta vel subscandens, caulis lignosis, teretibus, in siccitate brunneo-purpureis, partibus vetustioribus glabris vel subglabris, partibus junioribus petiolisque pilis numerosis filiformibus ferrugineis patulis vel subpatulis usque ad 5 mm longis instructis, internodiis 4 ad 7 cm longis; foliis in siccitate chartaceis, perspicue petiolatis (petiolo usque ad 6 cm longo), inaequilateraliter ovatis, basi rotundatis, haud cordatis, apice acuminatis, margine irregulariter distanterque dentatis, usque ad 12 cm longis, utrinque glabris vel nervis subtus ciliatis; infructescentiis terminalibus, pedunculatis, dichotome ramosis, circiter 20 cm latis; fructibus valde inaequaliter bialatis, capsulis cum aliis circiter 14 mm longis et 3.5 cm latis, aliis minoribus circiter 4 mm latis, majoribus chartaceis, circiter 2.5 cm latis, angustatis, acutis.

Erect or subscandent, at least 60 cm high, the stems terete, brownish purple, somewhat woody, about 4 mm in diameter, the older parts glabrous or nearly so, the younger parts and the petioles clothed with numerous, spreading, very slender, filiform, ferruginous hairs up to 5 mm in length, the internodes 4 to 7 cm long. Leaves chartaceous and olivaceous when dry, paler beneath, inequilaterally ovate, 10 to 12 cm long, 7 to 8 cm wide, base broadly rounded, not cordate, slightly inequilateral, 5- or 7-nerved, the apex acuminate, the margins irregularly and distantly toothed, not lobed, the upper surface glabrous, the lower usually somewhat ciliate on the nerves; petioles 4 to 6 cm long, very prominently ciliate; stipules oblong-ovate, acuminate, more or less ciliate on the back, up to 2 cm long. Inflorescences terminal, erect, peduncled, repeatedly dichotomous, about 15 cm long and 20 cm wide, glabrous, the peduncles up to 20 cm in length. Flowers unknown. Capsules about 1 cm long (excluding the wings), 2-celled, very unequally 2-winged, including the wings 14 mm long, 3.5 cm wide, the narrower wing rounded, 4 mm wide or less, the wider one chartaceous, about 2.5 cm wide, up to 16 mm high along the capsule, obliquely narrowed from the base to the tip, the upper margin straight, the apex acute.

LUZON, Rizal Province, Mount Angilog, *Bur. Sci. 40777 Ramos*, April 20, 1922. On forested slopes, altitude about 1,200 meters.

A very strongly marked species apparently not closely allied to any previously described form. Striking characters are its long-ciliate stems and petioles, its inequilaterally ovate but not at all cordate leaves; its repeatedly dichotomous, long-peduncled, lax, erect infructescences, and its numerous, 2-celled, very unequally 2-winged capsules, one wing being very narrow (4 mm or less), and the other narrowed upward along the lower margin to the acute tip, and up to 2.5 cm wide, about 16 mm high along the capsule, the upper margin straight, nearly at right angles with the axis of the capsule.

Begonia woodii sp. nov. § *Diploclinium*.

Herba nana, glabra, caulibus brevissimis, circiter 3 mm diametro; foliis plerumque solitariis, membranaceis, utrinque glabris, suboblique ovatis, 3 ad 6 cm longis, basi perspicue cordatis, leviter inaequilateralibus, lobis late rotundatis, apice acutis ad breviter acuminatis, margine irregulariter dentatis vel crenato-dentatis; petiolo filiforme, 2 ad 3 cm longo; inflorescentiis tenuibus, foliis subaequantibus, paucifloris; floribus ♂ roseis, circiter 1 cm diametro, sepalis petalisque membranaceis, subaequalibus, oblongo-obovatis, circiter 5 mm longis; antheris circiter 20, obovoideis, 0.5 mm longis; capsulis subaequaliter 3-alatis, circiter 6 mm longis, 8 ad 10 mm latis, utrinque truncatis vel rotundato-truncatis, vel basi late acutis, alis haud angustatis.

A small, delicate, glabrous herb, the stems very short, up to 1.5 cm long, 3 mm in diameter, usually bearing a single leaf. Leaves green, membranaceous, glabrous on both surfaces, subobliquely ovate, 3 to 6 cm long, 2.5 to 5 cm wide, the base prominently cordate, slightly inequilateral, the lobes broadly rounded, subequal, the sinus blunt, up to 1 cm deep, the apex acute to somewhat acuminate, the margins irregularly dentate or crenate-dentate, the teeth usually minutely spinulose; petioles very slender, 2 to 3 cm long; inflorescences about equaling the leaves, very slender. Staminate flowers pink, about 1 cm in diameter, the sepals and petals subequal, membranaceous, obovate to oblong-obovate, about 5 mm long. Anthers about 20, obovoid, 0.5 cm long. Capsules subequally 3-winged, about 6 mm long, including the wings 8 to 10 mm wide, truncate to broadly truncate-rounded at both ends, or the base broadly acute, not at all rhomboidal, the wings broadly rounded, 2.5 to 3.5 mm wide.

PALAWAN, Malampaya Bay, *Merrill 11589,* October 8, 1922. In the crevices of shaded cliffs in dense forests, altitude about 50 meters.

This very delicate species is apparently not closely allied to any previously described form; it certainly has no close allies among the numerous Philippine species. It is well characterized by its small, thin, usually solitary, glabrous leaves; its very slender petioles; its short rhizomes; and its very slender inflorescences together with its small flowers and capsules. The species is dedicated to Governor-General Leonard Wood, to whom I am under obligations for an opportunity to carry on some field work in botany in the neighborhood of Malampaya Bay in October, 1922.

Begonia pinamalayensis sp. nov. § *Diploclinium.*

Caulis repens, circiter 4 mm diametro, internodiis 3.5 ad 6 cm longis, partibus vetustioribus glabris vel subglabris, partibus junioribus petiolisque plus minusve longe ciliatis; foliis longe petiolatis, oblique ovatis, basi valde oblique cordatis, usque ad 17 cm longis, acuminatis, margine undulato-lobatis ad subintegris, in siccitate supra olivaceis, nitidis, subtus pallidioribus, ad nervis ciliatis; inflorescentiis longissime pedunculatis, diffusis circiter 12 cm latis; capsulis subaequaliter 3-alatis, circiter 6 mm longis. Species *B. longiscapae* Warb. affinis, differt capsulis multo minoribus.

Stems creeping, up to at least 40 cm long, about 4 mm in diameter, the internodes 3.5 to 6 cm long, in age nearly glabrous, the younger parts and the petioles more or less ciliate, when young rather densely so, with elongated, brownish to purplish, slender hairs attaining a length of 4 mm. Leaves long-petioled, obliquely ovate, the base strongly obliquely cordate and about 9-nerved, 15 to 17 cm long, 9 to 11 cm wide, the upper surface olivaceous, shining, glabrous, the lower surface paler, more or less ciliate on the nerves, the apex acuminate, margins undulate-lobed to subentire; petioles up to 18 cm long; stipules oblong to oblong-ovate, up to 1.5 cm long. Inflorescences axillary, long-peduncled, glabrous, the peduncles up to 20 cm in length, the inflorescence proper about 10 cm long and 12 cm wide, diffuse, many-flowered. Sepals of the pistillate flowers at least 6 mm long. Staminate flowers not seen. Capsules equally or subequally 3-winged, about 6 mm long, slightly wider than long, broadly rounded at both ends.

MINDORO, Pinamalayan, *Bur. Sci. 40856 Ramos,* May, 1922. On ledges and bowlders along forested stream banks at low altitudes.

This species belongs in the group with *Begonia longiscapa* Warb. and is closely allied to that species, differing essentially in its much smaller capsules.

Begonia coronensis sp. nov. § *Diploclinium.*

Herba subglabra; foliis suboblique ovatis, membranaceis, usque ad 16 cm longis, supra parcissime ciliatis, margine irregulariter undulato-lobatis subcrenatisque, dentibus plerumque molliter spinulosis, basi perspicue cordatis, leviter inaequilateralibus, lobis rotundatis, apice plerumque obtusis; petiolo crasso, circiter 10 cm longo; inflorescentiis foliis subaequantibus, paucifloris, floribus ♂ saltem 12 mm diametro; capsulis circiter 7 mm longis, 12 mm latis, subaequaliter 3-alatis, truncatis, basi late acutis, haud trapezoideis, alis rotundatis.

A nearly glabrous herb from short stout rhizomes. Leaves several, membranaceous, green, somewhat inequilaterally ovate, 12 to 16 cm long, 9 to 13 cm wide, the apex usually obtuse, base prominently cordate and slightly inequilateral, the lobes broadly rounded, the sinus narrow, acute, margins irregularly undulate-lobed and crenate, the teeth mostly spinulose-tipped, the soft process not exceeding 1 mm in length, the lower surface glabrous, the upper surface with very few scattered hairs on the nerves similar to the marginal ones; petioles stout, about 10 cm long. Inflorescences about equaling the leaves, robust, few-flowered. Staminate flowers at least 12 mm in diameter, the sepals elliptic-ovate rounded. Capsules not trapezoidal, subequally 3-winged, about 7 mm long and 12 mm wide, truncate, the base broadly acute, the wings rounded, 3 to 4 mm wide.

CALAMIAN ISLANDS, Coron, *Bur. Sci. 41164 Ramos,* September 17, 1922. On rocks and ledges along small streams in forests at low altitudes, in limestone formation.

While very different from *Begonia woodii* sp. nov. in its much larger size, large leaves, stout petioles and inflorescences, and slightly larger flowers and capsules, the present species manifestly belongs in the same group with *B. woodii,* and does not appear close to any hitherto described Philippine form.

Begonia zamboangensis sp. nov. § *Diploclinium* ?

Herba subglabra, caulis repens, radicantibus usque ad 14 cm longis, circiter 4 mm diametro; foliis longe petiolatis, dispersis, oblique ovatis, basi cordatis, circiter 7-nerviis, obtusis ad leviter acuminatis, margine undulatis vel undulato-lobatis, supra glabris, subtus ad nervis parce hirsutis, usque ad 16 cm longis, petiolo 12 ad 18 cm longo; inflorescentiis subracemosis, 12 ad 18 cm longis, floribus ♂ albidis, sepalis 2, ellipticis, membranaceis, circiter 13 mm longis, petalis 0; antheris circiter 12, 3 ad 4 mm longis; capsulis, alis inclusis, subellipsoideis, circiter 1.8 cm longis et 1.2 cm latis, inaequaliter 3-alatis, alis chartaceis vel subcoriaceis.

A nearly glabrous herb, the stems prostrate, rooting, up to 14 cm long, the leaves scattered, long-petiolate; lamina obliquely ovate, from the distinctly cordate base, which is only slightly inequilateral, 14 to 16 cm long, 12 to 14 cm wide, when dry membranaceous, olivaceous, the lower surface somewhat paler than the upper, the apex somewhat acuminate, margins undulate or shallowly undulate-lobed, the base about 7-nerved, the nerves prominent, reticulations lax, somewhat hirsute on the nerves beneath, glabrous on the upper surface; petioles 12 to 18 cm long, glabrous. Inflorescences subracemose, 12 to 18 cm long. Staminate flowers: Sepals 2, elliptic, white, glabrous, about 13 mm long; petals none; stamens about 13, the anthers 3 to 4 mm long. Capsules, including the narrow and rather thick wings, subellipsoid, about 1.8 cm long, 1.2 cm wide, the largest wing at most 3 mm wide, the two narrower ones 2 mm wide or less, all unusually thick, subacute to obtuse at both ends, not truncate.

MINDANAO, Zamboanga District, Malangas, *Bur. Sci. 37231, 37371* (type), *Ramos and Edaño,* November, 1919. On forested banks along small streams at low altitudes.

A rather strongly marked species, possibly belonging in the section *Diploclinium,* although its staminate flowers are apetalous. It is, however, also radically different from the other species in this section in its subracemose inflorescences and in its very narrowly winged, tardily dehiscent, nontruncate capsules.

Begonia parvilimba sp. nov. § *Petermannia.*

Herba erecta, vix ramosa, usque ad 20 cm alta, subglabra, vel caulis junioribus leviter strigoso-hirsutis; foliis submembra-

naceis, 3 ad 6 cm longis, inaequilateraliter oblongo-obovatis, irregulariter parcissime lobatis, spinuloso-dentatis, acuminatis, deorsum angustatis, plerumque cuneatis, haud cordatis, utrinque glabris, breviter petiolatis; floribus axillaribus, albidis, breviter pedicellatis, plerumque solitariis, circiter 1.3 cm diametro; capsulis subaequaliter 3-alatis, circiter 9 mm longis et 10 mm latis.

A slender, nearly glabrous, erect, usually unbranched herb up to 20 cm high, the younger parts of the stems often somewhat strigose-hirsute with short, rather stiff hairs. Leaves submembranaceous, 3 to 6 cm long, 1.5 to 2.5 cm wide, widest above the middle, gradually narrowed below to the cuneate, not at all cordate base, the narrower side acute, the wider side acute to subobtuse, the margins in the basal parts merely toothed, above the middle with usually one, rarely two lobes, and irregularly dentate, the teeth spinulose, the outline in general oblong-obovate; petiole slender, 3 mm long or less. Flowers axillary, shortly pedicelled, white, usually solitary, the staminate ones about 1.3 cm in diameter. Sepals elliptic, membranaceous, 6.5 mm long. Petals 2, narrowly oblong, nearly as long as the sepals, about 2 mm wide. Capsules subequally 3-winged, about 9 mm long, 10 mm wide.

MINDANAO, Zamboanga District, Malangas, *Bur. Sci. 36936* (type), *36933 Ramos and Edaño,* November, 1919. On rocks and ledges along streams at low altitudes.

The alliance of this species is manifestly with *Begonia mindanaensis* Warb., from which it is distinguished by its smaller size and its much smaller leaves and capsules. From *B. elatostematoides* Merr. it is at once distinguishable by its irregularly lobed and toothed, not entire or subentire leaves.

Begonia subprostrata sp. nov. § *Petermannia.*

Herba gracilis, circiter 25 cm alta, caulis tenuis, leviter hirsutis, deorsum prostratis vel subprostratis, nodis inferioribus radicantibus; foliis membranaceis, glabris, irregulariter inaequilateraliterque obovatis ad oblongo-obovatis, 5 ad 7 cm longis, margine irregulariter angulato-lobatis spinulosisque, deorsum distincte angustatis et valde lateraliter cordatis, apice acuminatis; inflorescentiis terminalibus, paniculatis, paucifloris, floribus ♂ circiter 1.5 cm diametro, sepalis oblongo-ovatis ad oblongis, circiter 4 mm latis, petalis binis brevioribus, multo angustioribus; capsulis aequaliter 3-alatis, subtrapezoideis, circiter 8 mm longis et 10 mm latis, alis subacutis.

A slender, slightly branched herb about 25 cm high, the lower parts of the stems prostrate or subprostrate, rooting at the nodes, nearly glabrous except for the somewhat hirsute stems. Leaves membranaceous, green, shining, glabrous, irregularly and inequilaterally oblong-obovate, 5 to 7 cm long, 2.5 to 3.5 cm wide, irregularly and angularly lobed and also spinulose, distinctly narrowed below to the laterally cordate base, the lobe on the wider side orbicular, about 7 mm in diameter, the narrower side subacute to obtuse, apex acuminate; petiole about 1 cm long. Panicles terminal, few-flowered, 5 to 7 cm long, slender. Staminate flowers pink or white, about 1.5 cm in diameter, the sepals 2, oblong-ovate to oblong, about 4 mm wide, the petals much shorter and narrower. Capsules equally 3-winged, subtrapezoidal, about 8 mm long, 10 mm wide, the wings acute or subacute.

MINDANAO, Zamboanga District, Malangas, *Bur. Sci. 36977* (type) *37222 Ramos and Edaño,* November, 1919, on the forested banks of small streams at low altitudes.

A species belonging in the same general group as *Begonia contracta* Warb., but much closer to both *B. brevipes* Merr. and *B. littleri* Merr. than to Warburg's species, differing from all three in its strongly laterally cordate leaves. It is probably most closely allied to *Begonia agusanensis* Merr., from which, among other characters, it is distinguished by its habit, its smaller leaves, and its much smaller capsules.

ARALIACEÆ

Genus **SCHEFFLERA** Forster

Schefflera angilogensis sp. nov. § *Euschefflera, Heptapleurum.*

Frutex scandens, glaber, ramis elongatis, 1.5 ad 2 mm diametro, pallidis; foliis 5-foliolatis, foliolis ovatis, perspicue acuminatis, basi acutis, sursum pauce (utrinque 2 vel 3) incurvato-serratis, subcoriaceis, 1.5 ad 2 cm longis, nervis utrinque 2 vel 3, petiolo 2 ad 3 cm longo; inflorescentiis terminalibus, pedunculis umbellulato-fasciculatis, circiter 4 cm longis, umbellis plerumque 4- vel 5-floris, floribus 5-meris, parvis, tenuiter pedicellatis.

A slender, glabrous, scandent shrub, the branches elongated, terete, pale, 1.5 to 2 mm in diameter, the internodes mostly about 1 cm long. Leaves 5-foliolate, their petioles 2 to 3 cm long; leaflets coriaceous, olivaceous, ovate, 1.5 to 2 cm long, 8 to 12 mm wide, abruptly and prominently acuminate, base acute, margins conspicuously 2- or 3-toothed on the shoulders below the apical acumen, the teeth slender, incurved; lateral nerves 2 or 3 on each side of the midrib, distinct; petiolules 4 to 7 mm long. Inflorescences terminal, umbellate, the rachis not produced, peduncles 4 or 5 terminating each branch, 4 cm long, each bearing 4 or 5 umbellately arranged flowers, the pedicels 1 to 1.5 cm long, slender, or the outer branches of each umbel bearing several umbellately arranged flowers. Flowers 5-merous, immature.

LUZON, Rizal Province, Mount Angilog, *Bur. Sci. 40748 Ramos*, April, 1922. On rocky summit ridges in thickets, altitude about 1,400 meters.

A remarkably distinct species, not closely allied to any previously described form, strongly characterized by its small, abruptly and stoutly acuminate leaflets which bear two or three incurved teeth on each side below the conspicuous acumen.

MYRSINACEÆ

Genus **ARDISIA** Swartz

Ardisia alverezii sp. nov. § *Acrardisia.*

Arbor parva, glabra, 3 ad 5 m alta; foliis ellipticis ad oblongo-ellipticis, chartaceis, 9 ad 16 cm longis, in siccitate plerumque brunneis, utrinque subaequaliter angustatis, apice obtuse acuminatis, basi acutis, distincte (1 ad 1.5 cm) petiolatis, margine integris, puncticulis majoribus destitutis; nervis utrinque 25 ad 30, tenuibus; inflorescentiis terminalibus, pyramidatis, circiter 10 cm longis, bipinnatim paniculatis, laxis, floribus in ramulis primariis elongatis racemoso-umbellulatis dispositis; sepalis petalisque leviter glandulosis, petalis oblongo-ellipticis ad elliptico-ovatis, acuminatis, 6 mm longis; antheris lanceolatis, acuminatis, 3.5 ad 4 mm longis, connectivo glanduloso.

A small glabrous tree 3 to 5 m high, the branches pale, terete. Leaves scattered, elliptic to oblong-elliptic, chartaceous, usually brownish when dry, 9 to 16 cm long, 4 to 6.5 cm wide, subequally narrowed to the acute base and to the obtusely acuminate apex, the margin entire, without large glands; lateral nerves slender, not prominent, 25 to 30 on each side of the midrib, somewhat more prominent than are the secondary nerves and the reticulations; petioles 1 to 1.5 cm long. Inflorescences terminal, pyramidal, rather lax, about 10 cm long, bipinnately paniculate, the primary branches few, spreading, 6 to 8 cm long, the flowers subracemosely umbellate near the ends of the primary branches, their pedicels 10 to 15 cm long. Sepals oblong-ovate, obtuse, glabrous, 1.2 mm long. Petals oblong-elliptic to elliptic-ovate, acuminate, about 6 mm long, 3 mm wide, somewhat glandular. Anthers lanceolate, acuminate, 3.5 to 4 mm long, their connectives somewhat glandular. Style 4 mm long. Fruits somewhat depressed-globose, about 6 mm in diameter, glandular.

BABUYAN ISLANDS, Calayan, *For. Bur. 26644 Velasco.* LUZON, Cagayan Province, Camalaniugan, *For. Bur. 21765 Barros, 7094 Klemme;* San Vicente, *For. Bur. 16850 Curran, 18435 Alvarez;* Claveria, *Bur. Sci. 3182 Ramos* (type): Apayao Subprovince, *Bur. Sci. 28244, 28386 Fénix.* In forests at low and medium altitudes.

All of the specimens cited above were originally identified as *Ardisia sulcata* Mez, with which, however, the present species has little in common. *Ardisia sulcata* Mez, placed by Mez in the section *Stylardisia,* is now represented in the Bureau of Science herbarium by a cotype, *Warburg 12286,* and I cannot distinguish from it the form described by me as *Ardisia leytensis.* The present species belongs in the section *Acrardisia* and is apparently very different from the other species placed here.

Genus DISCOCALYX Mez

Discocalyx leytensis sp. nov.

Frutex glaber, ramis brunneis, teretibus, circiter 7 mm diametro; foliis longe (4 ad 5 cm) petiolatis, subverticillatis, confertis, chartaceis, olivaceis, oblongo-oblanceolatis, 22 ad 28 cm longis, acuminatis, basi cuneatis, margine distanter denticulatis, nervis primariis utrinque circiter 18, perspicuis, secondariis reticulisque distinctis; paniculis pedunculatis, circiter 15 cm longis; floribus ♀ 5-meris, breviter pedicellatis, sepalis petalisque valde glandulosis, petalis oblongo-ovatis, obtusis, 2 mm longis; ovario glabro.

A glabrous shrub, the branches terete, brownish, about 7 mm in diameter, the apical parts with conspicuous petiolar scars. Leaves subverticillately crowded at the ends of the branches, chartaceous, olivaceous, oblong-oblanceolate, 22 to 28 cm long, 6 to 8 cm wide, the apex rather conspicuously acuminate, narrowed below to the cuneate base, the margins in the upper two-thirds distantly denticulate, the lower surface paler than the upper, not conspicuously glandular, the reticulations distinct on both surfaces, rather close; primary lateral nerves about 18 on each side of the midrib, prominent, the secondary ones distinct as are the reticulations; petioles stout, 4 to 5 cm long. Panicles peduncled, about 15 cm long, the primary branches up to 3 cm long. Pedicels about 1 mm long. Sepals oblong-ovate, acute, margins very obscurely ciliate, the base with a few very conspicuous glands. Petals oblong-ovate, obtuse, 2 mm long, with two irregular rows of very conspicuous dark glands along the middle. Ovary ovoid, sessile, glabrous; stigma sessile. Staminodes less than 1 mm long.

LEYTE, Mount Abucayan, *Bur. Sci. 41709 Edaño.* On forested slopes, altitude about 300 meters.

The inflorescences are detached, but are apparently borne at or near the tips of long specialized branches, as is the case with most other Philippine representatives of the genus. The specimen bears one of these specialized branches attached among the leaves, which is about 25 cm long, the apical part bearing several small leaves 5 to 10 cm in length and a number of bracts. Its alliance seems to be with *Discocalyx euphlebia* Merr. and *D. insignis* Merr.

CORNACEÆ

Genus **MASTIXIA** Blume

Mastixia crassifolia sp. nov. § *Tetramastixia.*

Arbor glabra, circiter 7 m alta, ramulis teretibus, laevis, crassis, circiter 8 mm diametro; foliis crasse coriaceis, alternis, ellipticis ad oblongo-ellipticis, 9 ad 12 cm longis, subolivaceis, breviter acuminatis, basi acutis, nervis utrinque circiter 12, subtus valde perspicuis; fructibus ellipsoideis, 2.3 ad 2.7 cm longis.

A glabrous tree (flowers unknown), about 7 m high, the branchlets terete, smooth, stout, about 8 mm in diameter, marked with widely scattered large petiolar scars. Leaves alternate, thickly coriaceous, elliptic to oblong-elliptic, 9 to 12 cm long, 3.5 to 6 cm wide, subolivaceous, the apex shortly acuminate, base acute; lateral nerves about 12 on each side of the midrib, very prominent on the lower surface; petioles very stout, 1 to 2 cm long. Infructescences terminal, 6 to 7 cm long. Fruits ellipsoid, 2.3 to 2.7 cm long, smooth, broadly rounded at both ends, crowned by the remains of the four calyx teeth.

LUZON, Benguet Subprovince, Mount Pologloco, *Bur. Sci. 40377 Ramos and Edaño,* September 30, 1921. In the mossy forest, altitude about 2,000 meters.

A species with much the general appearance of *Mastixia pachyphylla* Merr., but with alternate, not opposite leaves, which are moreover acuminate rather than rounded, and with more numerous nerves.

EBENACEÆ

Genus **DIOSPYROS** Linnæus

Diospyros calcicola sp. nov.

Frutex 1 ad 2 m altus, floribus exceptis glaber, ramis ramulisque teretibus, laevis, in siccitate atris; foliis chartaceis ad subcoriaceis, oblongis ad oblongo-ellipticis, usque ad 25 cm longis et 10 cm latis, breviter acuminatis, basi late rotundatis auriculato-cordatisque, subtus perspicue biglandulosis, brevissime petiolatis; nervis primariis utrinque circiter 12, subtus valde perspicuis, anastomosantibus, reticulis laxis; floribus axillaribus, ut videtur solitariis vel binis, sessilibus; fructibus junioribus globosis vel depresso-globosis, 8-locellatis, circiter 1.5 cm diametro, adpresse pubescentibus glabrescentibusque; calycis persistentibus 4-angulatis, circiter 1 cm latis, coriaceis, in siccitate nigricantibus, leviter pubescentibus, 4-lobatis, lobis late ovatis, margine leviter revolutis.

A shrub 1 to 2 m high, glabrous except the flowers, the branches and branchlets terete, smooth, black when dry, the ultimate branchlets about 3 mm in diameter. Leaves oblong to oblong-elliptic, 22 to 25 cm long, 8 to 10 cm wide, chartaceous to subcoriaceous, subolivaceous, somewhat shining, shortly acuminate, the base broadly rounded and peculiarly auriculate-cordate, the auricles somewhat inflexed and partly covering the two large basal glands, one on each side of the midrib; primary lateral nerves about 12 on each side of the midrib, prominent on the lower surface, anastomosing, the reticulations lax; petioles stout, 5 mm long or less. Flowers unknown. Fruits axillary, solitary or in pairs, sessile, when young globose or depressed-globose, 1.5 cm in diameter, 8-celled, brown when dry, the pericarp rather thin, more or less appressed pubescent, becoming glabrous. Persistent calyx nearly square, about 1 cm wide, coriaceous, somewhat pubescent, 4-lobed, the lobes ovate, their margins somewhat revolute.

CALAMIAN ISLANDS, Coron, *Bur. Sci. 41167 Ramos*, September 17, 1922. Abundant locally along small streams in dry forests on limestone formation.

A species strongly characterized by its leaves being peculiarly auriculate-cordate at the base, the inner margins of the auricles being more or less inflexed and somewhat concealing the two large conspicuous basal glands, one on each side of the midrib. Coron Island is composed entirely of sharply eroded limestone.

CONVOLVULACEÆ

Genus **LETTSOMIA** Roxburgh

Lettsomia philippinensis sp. nov.

Frutex scandens, subglaber; foliis oblongo-ovatis, chartaceis, acute acuminatis, basi rotundatis, 8 ad 12 cm longis, supra glabris, subtus praesertim ad costa parcissime ciliato-hirsutis; inflorescentiis axillaribus, breviter (1 ad 2 cm) pedunculatis, paucifloris; floribus circiter 1.5 cm longis, sepalis elliptico-ovatis, circiter 3 mm longis, glabris vel parcissime hirsutis, corolla angusta, extus in partibus superioribus adpresse hirsuta, deorsum glabra.

A woody vine, the stems and branches glabrous, pale brownish. Leaves oblong-ovate, chartaceous, brownish olivaceous, somewhat shining, 8 to 12 cm long, 3.5 to 7 cm wide, the apex sharply acuminate, base rounded, the upper surface glabrous, the lower slightly paler and with a very few long scattered hairs chiefly on or near the midrib; lateral nerves about 7 on each side of the midrib, distinct; petioles 2.5 to 3 cm long. Cymes axillary, few-flowered, short-peduncled, 3.5 to 4.5 cm long, the bracts small and inconspicuous. Flowers white, about 1.5 cm long. Calyx glabrous or nearly so, the sepals elliptic-ovate, 3 mm long, obtuse. Corolla narrow, scarcely enlarged upward, very shortly lobed, the upper one-half externally appressed-hirsute, the lower one-half glabrous. Ovary ovoid, 2-celled, glabrous; stigma capitate, not 2-lobed. Very young fruit ovoid, glabrous, about 1 cm long.

LUZON, Laguna Province, San Antonio, *Bur. Sci. 10964* (type), *23795 Ramos*, August, 1910, and October, 1915, the latter distributed as *Rivea luzonensis* Hallier f. In damp forests at low altitudes.

This is the first record of *Lettsomia* from the Philippines, although it seems probable that our two species of *Rivea*, *R. luzonensis* Hallier f. and *R. barnesii* Merr., would be better placed in *Lettsomia* than in *Rivea;* the present species is clearly a *Lettsomia*, the latter genus being scarcely distinguishable from *Argyreia*, as Prain has already noted. From *Rivea luzonensis* Hallier f. the present species is at once distinguishable by its short-peduncled cymes, its glabrous or nearly glabrous calyces, and its smaller flowers, the corolla being entirely glabrous in the lower one-half and appressed-hirsute in the upper one-half.

BIGNONIACEÆ

Genus **RADERMACHERA** Hasskarl

Radermachera brachybotrys sp. nov.

Arbor parva, partibus junioribus exceptis glabra; foliis circiter 20 cm longis, bipinnatis, foliolis lanceolatis, chartaceis, 3 ad 4 cm longis, caudato-acuminatis, basi decurrento-acuminatis; inflorescentiis lateralibus, plerumque e axillis defoliatis, 3 ad 6 cm longis, paucifloris, puberulis vel leviter cinereo-pubescentibus, racemosis vel depauperato-paniculatis; floribus circiter 3.5 cm longis; folliculis circiter 20 cm longis et 5 mm diametro.

A small, nearly glabrous tree, the branches smooth, terete, pale grayish, glabrous, the branchlets somewhat pubescent. Leaves bipinnate, about 20 cm long, the primary pinnæ a single pair, about 7 cm long, each pinna usually bearing 5 leaflets; leaflets chartaceous, scarcely shining, pale olivaceous, lanceolate, 3 to 4 cm long, 1.5 to 2 cm wide, caudate-acuminate, base decurrent-acuminate, the lateral nerves slender. Inflorescences mostly lateral and from the axils of fallen leaves, racemose or depauperate-paniculate, few-flowered, 3 to 6 cm long, slightly pubescent or puberulent. Flowers purplish and white, about 3.5 cm long. Calyx about 1 cm long, subequally 3-lobed, the lobes broadly ovate, short, the tube narrowed below, cylindric, not at all ribbed, punctate. Corolla glabrous. Follicles about 20 cm long, 4 to 5 mm in diameter. Seeds 3 mm long, including the two wings about 8 mm wide.

LEYTE, Mount Abucayan, *Bur. Sci. 41688 Edaño*, January, 1923. On slopes, altitude about 350 meters.

A species well characterized by its very short inflorescences.

GESNERIACEÆ

Genus **DIDYMOCARPUS** Wallich

Didymocarpus woodii sp. nov. § *Heteroboea*.

Subacaulis; foliis numerosis, confertis, membranaceis, oblanceolatis, 8 ad 14 cm longis, 1.5 ad 2.5 cm latis, acutis, sessilibus vel brevissime petiolatis, utrinque longe ciliatis, margine crenato-serratis, nervis utrinque usque ad 20, perspicuis; pedunculis usque ad 10 cm longis, tenuis, 1-floris; floribus purpureis, sepalis lanceolatis, 3 mm longis, corollae tubo circiter 3 cm longo, limbus circiter 3 cm diametro; capsulis linearis, circiter 6 cm longis.

Acaulescent or subacaulescent, conspicuously ciliate especially in the central part of the rosette, the leaves crowded, oblanceolate, sessile or nearly so, membranaceous, 8 to 14 cm long, 1.5 to 2.5 cm wide, conspicuously ciliate on both surfaces with long weak hairs and also more or less pubescent with short hairs, the apex acute, the margins distinctly crenate-serrate; lateral nerves about 20 on each side of the midrib, conspicuous. Peduncles several from each rosette, slender, about 10 cm long, pubescent, 1-flowered. Flowers pale purple, the sepals lanceolate, about 2.5 mm long, free or nearly so, pubescent. Corolla tube sparingly pubescent, slender, somewhat curved, about 3 cm long, the limb somewhat oblique, about 3 cm in diameter, the lobes elliptic-obovate, 1 to 1.5 cm long. Capsules linear, about 6 cm long, sparingly pubescent.

PALAWAN, Malampaya Bay, *Merrill 11587*, October 8, 1922. In the crevices of cliffs in densely forested regions, altitude about 50 meters.

A beautiful species belonging in the group with the Bornean *Didymocarpus gracilipes* C. B. Clarke, and the first representative of the genus to be found in the Philippines. It is dedicated to Governor-General Leonard Wood, to whom I am indebted for the opportunity of visiting many remote parts of the Archipelago.

ACANTHACEÆ

Genus **HYPOESTES** R. Brown

Hypoestes halconensis sp. nov.

Herba erecta, ramosa, circiter 1 m alta, inflorescentiis, minute capitato-pubescentibus exceptis glabra vel subglabra; foliis membranaceis, olivaceis, oblongo-lanceolatis, 22 ad 30 cm longis, tenuiter acuminatis, longe petiolatis, nervis utrinque circiter 12, perspicuis; inflorescentiis laxis, ramis primariis elongatis, usque ad 15 cm longis; involucris laxe dispositis leviter imbricatis, minute capitato-pubescentibus 13 ad 14 mm longis, bracteis exterioribus deorsum (5 ad 6 mm) connatis, lanceolatis, tenuiter acuminatis, 3 mm latis, interioribus angustioribus, 2 mm latis; calycis membranaceis, pubescentibus, 4 mm longis, lobis lanceolatis, 2 mm longis, tubo aequantibus; corollae tubo 10 mm longo, lobis 1.5 cm longis, angustioribus 1.3 mm latis, majoribus 3 ad 3.5 mm latis.

An erect branched herb about 1 m high, glabrous or nearly so except the minutely capitate-pubescent inflorescences. Leaves membranaceous, olivaceous, oblong-lanceolate, glabrous, 22 to 30 cm long, 7 to 10 cm wide, narrowed upward to the slenderly acuminate apex, the base acute; lateral nerves about 12 on each side of the midrib, slender, distinct; petioles 4 to 7 cm long. Inflorescences lax, the primary branches up to 15 cm long, the involucres spicately arranged, slightly imbricate, the subtending bracteole linear, acicular, acuminate, 2.5 to 3 mm long. Involucres 13 to 14 mm long, minutely capitate glandular, the outer bracts united for the lower 5 to 6 mm, lanceolate, slenderly acuminate, 3 mm wide, the inner two 2 mm wide. Calyx 4 mm long, membranaceous, densely and softly pubescent, the lanceolate lobes 2 mm long, equaling the tube. Corolla 2.5 cm long, sparingly pubescent, the slender tube 1 cm long, the lips about 1.5 cm long, the narrower one 1.3 mm wide, the other 3 to 3.5 mm wide, 3-lobed, the lobes ovate, about 2 mm long, the middle one wider than the lateral ones. Filaments glabrous; anthers oblong, 2.2 mm long.

MINDORO, Mount Halcon, *Bur. Sci. 40715 Ramos and Edaño,* March 9, 1922. On forested slopes, altitude about 1,000 meters.

Among the Philippine species most closely allied to *Hypoestes vidalii* C. B. Clarke, from which it is readily distinguishable by its much larger, more numerously nerved leaves and the greatly elongated primary branches of its lax inflorescences.

CAPRIFOLIACEÆ

Genus **VIBURNUM** Linnæus

Viburnum cornutidens sp. nov.

Arbor parva, glabra, ramis lenticellatis; foliis crasse coriaceis obovatis, nitidis, usque ad 14 cm longis et 10 cm latis, rotundatis ad breviter obtuseque acuminatis, basi acutis, margine perspicue corniculato-dentatis, nervis utrinque circiter 9, perspicuis, rectis; corymbis circiter 12 cm longis et 15 cm latis; fructibus numerosis, ovoideis, compressis, acutis, obscure bisulcatis, circiter 7 mm longis.

A glabrous tree about 5 m high, the branches terete, dark reddish brown, conspicuously lenticellate, the ultimate branchlets 4 to 5 mm in diameter. Leaves thickly coriaceous, shining, olivaceous or brownish olivaceous, obovate, 10 to 14 cm long, 7 to 10 cm wide, rounded to shortly and obtusely acuminate, base acute, margins conspicuously corniculate-dentate, the teeth straight, obtuse, 1 to 1.5 mm long, chiefly terminating primary nerves; lateral nerves usually 9 on each side of the midrib, prominent on both surfaces, straight, once, sometimes twice forked one-half to two-thirds to the margin, prominently glandular in the axils of these secondary veins, the ultimate reticulations close, not conspicuous; petioles 2 to 3.5 cm long. Corymbs terminal, about 12 cm long and 15 cm wide, about 7 peduncles terminating the branchlet, these about 7 cm long and 2 mm in diameter, sulcate or angular, the umbellately arranged secondary branches usually 5, up to 2.5 cm long, the tertiary branches 1 cm long or less. Fruits numerous, ovoid, compressed, wrinkled when dry, obscurely 2-sulcate, acute, sessile, about 7 mm long.

LUZON, Benguet Subprovince, Mount Baudan, *Bur. Sci. 40309 Ramos and Edaño*. On forested slopes, altitude about 1,800 meters.

Igorot name, *manano*.

A species in the group with *Viburnum glaberrimum* Merr. It is distinguished by its conspicuously corniculate-dentate leaves, those of *V. glaberrimum* being entire.

RUBIACEÆ

Genus PRISMATOMERIS Thwaites

Prismatomeris obtusifolia sp. nov.

Frutex glaber, ramulis perspicue angulatis: foliis ellipticis ad oblongo-ellipticis, chartaceis, nitidis, 9 ad 16 cm longis, apice latissime rotundatis, basi acutis, nervis utrinque circiter 8, tenuis, patulis; floribus in axillis superioribus, solitariis vel depauperato-cymosis, longe pedicellatis, 5-meris, corollae tubo 2 cm longo, lobis lanceolatis, leviter falcatis, circiter 1.8 cm longis; fructibus junioribus ellipsoideis, circiter 8 mm longis.

An erect glabrous shrub, the branches rather stout, grayish brown, terete or subterete, the branchlets 3 to 5 mm in diameter, sharply angled, the internodes short. Leaves elliptic to oblong-elliptic, brownish to olivaceous, shining on both surfaces, smooth, 9 to 16 cm long, 3 to 6 cm wide, chartaceous, apex broadly rounded, base acute; lateral nerves about 8 on each side of the midrib, slender, spreading, arched-anastomosing, the reticulations lax; petioles stout, 2 to 3 mm long; stipules deciduous. Flowers white, 5-merous, solitary in the uppermost axils or in few-flowered depauperate cymes, their pedicels slender, about 2 cm long, the rachis, when present, at most 1 cm long. Calyx about 5 mm long, cup-shaped, truncate and minutely 5-toothed, narrowed below. Corolla tube cylindric, 2 cm long, the lobes 5, lanceolate, somewhat falcate, about 1.8 cm long and 4 mm wide. Stamens included, the anthers oblong, 3.5 mm long. Young fruits about 8 mm long, ellipsoid, crowned by the conspicuous calyx limb, 1-celled, 1-seeded, the seeds somewhat hippocrepiform in cross section.

BUSUANGA, Concepcion, *Bur. Sci. 41193 Ramos,* September 8, 1922 (type). PALAWAN, Malampaya Bay, *Bur. Sci. 21557 Escritor,* August, 1913. In thickets near the seashore.

A very distinct species strongly characterized by its leaves being broadly rounded at their apices as well as by its relatively large, solitary or depauperate-cymose flowers.

Genus **PSYCHOTRIA** Linnæus

Psychotria merrittii sp. nov. § *Grumilea.*

Frutex glaber, circiter 2.5 m altus; foliis submembranaceis ad chartaceis, oblongo-ellipticis, 9 ad 16 cm longis, perspicue acuminatis, basi acutis, nervis utrinque 10 ad 13, perspicuis, patulis, curvatis; inflorescentiis laxis, paniculatis, paucifloris, pedunculatis 7 ad 9 cm longis; floribus tenuiter pedicellatis, magnis, circiter 8 cm longis; fructibus ellipsoideis, laevis, haud sulcatis, circiter 8 mm longis, seminibus plano-convexis, albumine perspicue ruminato.

A glabrous shrub about 2.5 m high, the branches slender, terete, smooth. Leaves submembranaceous to chartaceous, olivaceous, slightly shining, oblong-elliptic, 9 to 16 cm long, 3.5 to 6 cm wide, subequally narrowed to the acute base and to the slenderly and sharply subcaudate-acuminate apex; lateral nerves 10 to 13 on each side of the midrib, prominent, spreading, curved, anastomosing very close to the margin, the reticulations rather distinct under a lens; petioles 1.5 to 2.5 cm long; stipules deciduous. Panicles terminal, peduncled, lax, very few-flowered, 7 to 9 cm long, the pedicels slender, 5 to 10 mm long. Flowers unusually large, white, about 8 mm long, the corolla tube broad, about 3 mm long, the lobes oblong, 5 mm long, the throat densely bearded. Fruits ellipsoid, smooth, not at all sulcate, about 8 mm long. Seeds plano-convex, the albumen ruminate.

MINDORO, Mount Halcon, *Bur. Sci. 40599 Ramos and Edaño,* March 16, 1922 (type), *For. Bur. 4365, 4396 Merritt,* June, 1906. On forested slopes, altitude about 1,400 meters. Two imperfect specimens from Panay, *Bur. Sci. 30708, 30669 Ramos and Edaño,* distributed as this species, represent an entirely different form.

Psychotria merrittii is strongly characterized by its very few-flowered lax inflorescences and its unusually large leaves. In vegetative characters it somewhat approximates *Psychotria pinnatinervia* Elm., but is totally different from that species in its inflorescences, flowers, and fruits, and is not closely allied to it.

Genus **TIMONIUS** de Candolle

Timonius pachyphyllus sp. nov.

Frutex glaber, circiter 4 m alta, ramulis circiter 4 mm diametro; foliis crasse coriaceis, oblongis ad oblongo-oblanceolatis, in siccitate brunneis, 10 ad 13 cm longis, 3 ad 4 cm latis, obtusis, basi cuneatis; nervis utrinque circiter 9, tenuibus, quam secondariis vix magis distinctioribus, adscendentibus, reticulis subtus obscurissimis, supra distinctioribus, subradiatis; infructescentiis 2 ad 3 cm longis, ramis binis, paucifloris; fructibus sessilibus, ovoideis, circiter 7 mm diametro.

A glabrous shrub about 4 m high, branchlets pale, obscurely angled, about 4 mm in diameter. Leaves thickly coriaceous, brown and somewhat shining, oblong to oblong-oblanceolate, 10 to 13 cm long, 3 to 4 cm wide, obtuse, base cuneate; lateral nerves about 9 on each side of the midrib, slender, the primary ones scarcely more distinct than are the secondary ones, the reticulations obscure and not at all radiate on the lower surface, on the upper surface more distinct, and subradiate; petioles stout, 1 to 1.5 cm long. Infructescences axillary, peduncled, 2-branched, 2 to 3 cm long, a single flower in the fork of the branches, the branches usually with two to four flowers. Fruits ovoid, sessile, about 7 mm in diameter, crowned by the conspicuous truncate calyx rim.

LUZON, Rizal Province, Mount Angilog, *Bur. Sci. 40794 Ramos* (type), April 20, 1922; Mount Irig, *Bur. Sci. 42277 Ramos,* April, 1923. On forested slopes, altitude about 1,200 meters.

A species undoubtedly next to *Timonius appendiculatus* Merr., although its flowers are unknown; it presents the same peculiarly radiate or subradiate type of ultimate reticulations as does that species, although in the present form evident only on the upper surface. It differs further from *T. appendiculatus* Merr. in its larger, thicker, obtuse leaves and in its much fewer, larger fruits, each branch of the infructescence bearing but one or two fruits.

Genus **WENDLANDIA** Bartling

Wendlandia warburgii sp. nov.

Frutex vel arbor parva, subglabra, ramis glabris, ramulis junioribus breviter adpresse pubescentibus; foliis parvis, lanceolatis, chartaceis ad subcoriaceis, in siccitate olivaceo-castanaceis, supra glabris, subtus pallidioribus, obscure breviter pubescentibus, 5 ad 8 cm longis, 1 ad 1.5 cm latis, utrinque acuminatis, nervis utrinque circiter 5, distinctis; petiolo 5 ad 8 mm longo; stipulis oblongis, 1.5 mm longis, obtusis vel acutis; paniculis circiter 3 cm longis, pedunculatis; floribus glabris, circiter 4 mm longis.

A nearly glabrous shrub or small tree, the branches brownish, glabrous, the slender branchlets minutely appressed-pubescent. Leaves small, chartaceous to subcoriaceous, slenderly acuminate at both ends, 5 to 8 cm long, 1 to 1.5 cm wide, the upper surface brownish olivaceous, somewhat shining, glabrous, the lower surface paler, sparingly pubescent with short scattered hairs; lateral nerves about 5 on each side of the midrib, distinct; petioles 5 to 8 mm long; stipules oblong, obtuse to acute, 1.5 mm long. Panicles terminal, peduncled, about 3 cm long, 2.5 cm in diameter, the flowers somewhat crowded, glabrous, the rachis and branches sparingly appressed-pubescent with short hairs. Calyx glabrous, about 1.5 mm long, the lobes elliptic, rounded, about as long as the tube. Corolla tube about 3 mm long, the lobes elliptic, rounded, 1 mm long. Bracteoles spatulate, about 1 mm long, the bracts similar but somewhat larger.

LUZON, Isabela Province, *Warburg 12016*, April, 1888.

A very distinct species, strongly characterized among all the hitherto described Philippine forms by its unusually small leaflets. From the débris attached to some of the branchlets it is suspected that this stenophyllous form grows along the margins of small streams subject to sudden rises of water. It is not matched by any other collection so far made in the Philippines.

Genus **WILLIAMSIA** Merrill

Williamsia mimica sp. nov.

Frutex circiter 1 m altus, subglaber, ramis ramulisque tenuibus, glabris, ramulis ultimis circiter 1 mm diametro; foliis lanceolatis ad oblongo-lanceolatis, 7 ad 9 cm longis, chartaceis, tenuiter acuminatis, basi acutis ad subrotundatis, in siccitate

pallidis, costa utrinque plus minusve ciliato-pilosa excepta glabris, nervis utrinque circiter 7, valde perspicuis, curvato-adscendentibus; floribus axillaribus, solitariis vel binis, breviter pedicellatis, corollae tubo cylindrico, glabro, 3 mm longo, lobis 5 vel 6, oblongo-lanceolatis, 5 mm longis; calycis tubo 5 mm longo, cylindrico, lobis triangulari-ovatis, acuminatis, 1.2 mm longis; bracteis involucrantibus binis, inferioribus profunde 4-lobatis, lobis ovatis ad lanceolatis, 2 mm longis, superioribus cupulatis, 3 mm diametro, lobis late triangulari-ovatis, acuminatis.

A shrub about 1 m high, the branches and branchlets slender, glabrous, the latter about 1 mm in diameter. Leaves lanceolate to oblong-lanceolate, chartaceous, pale when dry, 7 to 9 cm long, 1.5 to 3 cm wide, narrowed upward to the slenderly acuminate apex and below to the acute to somewhat rounded base, glabrous except for the midrib which is somewhat ciliate-pilose on both surfaces; lateral nerves about 7 on each side of the midrib, prominent, curved-ascending, anastomosing; petioles about 7 mm long; stipules narrowly oblong or linear-oblong, about 1 cm in length. Flowers axillary, solitary or in pairs, shortly pedicellate, white, the basal bracts forming a deeply 4-lobed involucre, the lobes ovate to lanceolate, 2 mm long, the upper or inner series forming a cup-shaped involucre, its lobes broadly triangular-ovate, acuminate, somewhat pubescent, 1.3 mm long. Calyx tube 5 mm long, glabrous, cylindric, the lobes triangular-ovate, acuminate, 1.2 mm long. Corolla tube glabrous, cylindric, 3 mm long, the lobes 5 or 6, oblong-lanceolate, 5 mm long, 1 to 1.2 mm wide, obtuse, the throat densely villous.

MINDANAO, Bukidnon Subprovince, Mount Candoon, *Bur. Sci. 38790 Ramos and Edaño.* On damp forested slopes, altitude about 1,000 meters. *No. 38838* of the same collection and from the same locality, an imperfect fruiting specimen, probably represents the same species.

A species in general appearance strongly simulating *Urophyllum acuminatum* Merr. Among the described forms of the genus *Williamsia* it is readily distinguishable by its unusually small leaves.

THE NICOTINE CONTENT OF PHILIPPINE TOBACCO STEMS

By WALTER L. BROOKE
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Tobacco stems from the Manila cigar factories at the present time have two local uses and one foreign. Chinese soap makers buy the stems at the factories as they accumulate, at 4 pesos per 1,000 kilograms. The stems are sundried and then burned. The ash is used in the manufacture of the soap which is known in the local market as "Chinese soap." The demand for stems exceeds the supply.

The other local use is for fertilizer. One manufacturer of fertilizer buys all the stems of a large factory at 2 pesos per metric ton; formerly the price was 1 peso per metric ton. However, the stems are mixed with dirt and other waste.

One manufacturer who formerly sold his stems to the Chinese soap makers now exports them to Germany where they are utilized in the manufacture of tobacco products. The stems for export are of good quality and sell for 8 pesos per 1,000 kilograms.[1]

An analysis of the tobacco stems of five Manila factories was made to determine if it woud be profitable to manufacture nicotine sulphate for use as an insecticide. The stems were secured from the stripping room at the factory and brought to the laboratory of the Bureau of Science and the moisture content determined without delay. The stems were weighed and then dried in a Freas electric oven at slightly below 60° C. until they could be pulverized by pounding in an iron mortar. The analysis was made on the dry powdered sample, by the Kissing method. All the determinations were made in duplicate and the average of the two checks was recorded. From the percentage of moisture and the nicotine content on the dry basis, the percentage of nicotine on the wet basis was computed. The analytical results are as shown in Table 1.

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[1] Since this article was written, the price of stems on the Manila market has increased to 12 pesos per 1,000 kilograms, and the demand for stems exceeds the supply.

TABLE 1.—*Nicotine content of tobacco stems.*

	Sample No.—						
	1	2	3	4	5	6	7
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Moisture	17.45	22.53	10.94			18.16	12.73
Nicotine:							
Wet basis	0.171	0.484	0.395			0.291	0.285
Dry basis	0.208	0.625	0.444	0.318	0.540	0.355	0.327

Sample 3 consisted of Sumatra wrapper stems; sample 5, of Georgia wrapper stems. Sample 7 was in the office of the factory several days before it was received at the laboratory; it consisted of a mixture of various Philippine tobaccos. Samples 1, 2, 4, and 6 were Isabela tobacco.

At a wholesale price [2] of 1.20 dollars per pound for a 40 per cent nicotine solution of nicotine sulphate, tobacco stems having a nicotine content of 0.171 per cent on a wet basis would yield 7.56 pounds of 40 per cent nicotine solution for every 1,000 kilograms of stems. This would be equivalent to 18.15 pesos per 1,000 kilograms if we assume an 80 per cent recovery of the nicotine. Tobacco stems having a nicotine content of 0.484 per cent would yield 21.29 pounds of 40 per cent nicotine solution, equivalent to a return of 51.11 pesos per 1,000 kilograms of stems.

These two values represent the extremes of what might be expected. Although the percentage of recovery is not known on a commercial scale, 80 per cent is thought to be practical. The only materials required in the distillation are sulphuric acid and lime. The cost, based on 7 pesos per 100 pounds for commercial sulphuric acid of 66° Baumé and at 60 pesos per ton for lime, would not be very high. The cost of a crude distillation equipment of sufficient size to treat 100 kilograms of stems at a time, exclusive of the boiler for steam generation, would probably not exceed 250 pesos. The stems, after the nicotine extraction, could still be used for fertilizer purposes and would be especially valuable for acid soil.

The most profitable nicotine sulphate manufacture no doubt would be from *Nicotiana rustica,* which has a nicotine content of from 6 to 8 per cent. The best Isabela tobacco sells in Manila for 0.75 peso per kilogram, or 750 pesos per metric ton. Nicotine production from *Nicotiana rustica* would yield a return of 739 pesos per metric ton, based on an average nicotine content of 7 per cent and recovery of 80 per cent and a price for nicotine sulphate (40 per cent nicotine content) of 2.40 pesos per pound.

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[2] Quoted by a San Francisco dealer in insecticides.

It would not be profitable to grow *Nicotiana rustica* for nicotine manufacture on land upon which good Isabela tobacco can be produced; but land which produces tobacco of a poor grade (like that from Cebu, which sells in Manila at 14 pesos per 46 kilograms, or 304 pesos per 1,000 kilograms) could be profitably utilized for growing *Nicotiana rustica.*

Nicotiana rustica, if grown for the manufacture of nicotine sulphate, would probably yield a return of 739 pesos per metric ton. If land now devoted to the growing of Cebu tobacco, which at the present time sells for 304 pesos per 1,000 kilograms, were utilized to grow *Nicotiana rustica,* there would be a margin of 435 pesos, which is more than would be required to make the extraction of nicotine profitable. The tobacco waste could be returned to the soil or used for fertilizer manufacture.

SUMMARY

1. The nicotine content of the tobacco stems secured from five different Manila cigar factories is given.

2. Estimates are given which show that nicotine recovery at present prices would probably be a commercial possibility, but under existing market conditions competition would result in an increase in price for stems.

3. The growing of *Nicotiana rustica* for nicotine manufacture in the Isabela district would be unprofitable, but in places where cheap tobacco is now grown the growing of *N. rustica* for nicotine sulphate manufacture would be profitable.

SEMISELECTIVE ANTISEPTIC EFFECT OF THE VAPORS OF VEGETABLE OILS, ESSENTIAL OILS, THEIR CONSTITUENTS, AND SIMILAR COMPOUNDS

By OTTO SCHÖBL

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ONE PLATE

In a previous paper[1] reporting results of experiments on the vapors of vegetable oils, it was demonstrated that the volatile constituents of certain essential oils show a strong indication of a semiselective antiseptic effect. The previous experiments were arranged primarily to learn the effect of the vapors of vegetable and essential oils on the growth of acid-fast bacteria. Certain non-acid-fast bacteria were included in these tests, however, and the semiselective effect of the volatile constituents of the oils became evident. The findings, interesting as they are from a theoretical and a sanitary standpoint, led us to extend our experiments to various groups of bacteria and to a larger series of compounds than was done previously. The technic as applied in the present experiments was the same as described previously.[1]

The results are tabulated in Plate 1, in which the chemicals tested are arranged in alphabetical order. All tests were repeated, the illustration giving the average results.

All of the cultures tested represent pathogenic microörganisms. The collection includes *B. tuberculosis* as a representative of acid-fast bacteria; next is placed *B. diphtheriæ,* this being systematically closely related; then follow three Gram-positive cocci, *Staphylococcus, Streptococcus,* and *Pneumococcus,* and one Gram-negative coccus, *Micrococcus catarrhalis;* then three Gram-negative representatives of the typhoid-coli group, *B. coli, B. typhosus,* and *B. dysenteriæ;* next come *Vibrio choleræ,* which was included because of its shape, and *B. anthracis* on account of its size; a chromogenic bacterium producing soluble pigment, *B. pyocyaneus,* was added to the collection.

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[1] Schöbl, Otto, and Hiroshi Kusama, Philip. Journ. Sci. 24 (1924) 443 to 445.

Untreated control cultures were planted of each bacterium. Only one strain of each bacterium was used. The results were recorded in two and again in four weeks in the case of *B. tuberculosis,* and in forty-eight hours in the case of the other cultures. Besides untreated control cultures several nonvolatile vegetable oils were included, which served as controls. The results in Plate 1 are recorded as growth; that is to say, three plus marks mean growth as good as control, that is, all over the slant; two plus marks mean slight inhibition of growth, that is, in the upper third of the slant; and one plus mark signifies strong inhibition, that is, traces of growth at the butt of the slant. The zero mark means no growth at all.

It is evident that the antiseptic result of a chemical tested under these conditions is the combined effect of the volatility and diffusibility of its constituents and of their antiseptic action. The volatile constituents are in a more concentrated state at the plug end of the culture tube where the chemical has been placed than at the butt end, since the test tube was handled and incubated in a plug-down position. Although the quantitative concentration of the vapors in the lower and upper part of the culture tube's air space is not known, comparison can be made between the various bacteria, the conditions having been the same in all culture tubes.

The graphic tabulation of the results shows the difference in susceptibility of the various bacteria; at the same time, certain grouping becomes apparent.

In the typhoid-dysentery-coli group the highest curve is that of *B. coli,* which shows the highest resistance in this group of bacteria. The curve rises in its first part and shows five depressions and two marked drops in the last third. *Bacillus dysenteriæ* shows an initial drop, but otherwise the curve is very similar to that of *B. coli,* the only difference being that the depressions are greater. *Bacillus typhosus* gives a curve similar to that of *B. coli,* but the depressions in the curve are even greater than those in the *B. dysenteriæ* curve, and the straight line between the two drops in the last third of the curve is interrupted by two depressions. This shows that *B. coli* is highest in resistance, *B. dysenteriæ* less and *B. typhosus* least resistant in this group. *Vibrio choleræ* runs a curve similar to that of *B. dysenteriæ* at the start, the rest of the curve showing greater depressions than that of *B. typhosus* and one additional drop. It is apparently less resistant than *B. typhosus.*

When we consider the group of cocci, *Streptococcus* runs a curve very similar to that of *M. catarrhalis,* but the depressions in the last third of the curve are more pronounced. The *Pneumococcus* curve resembles more that of *Staphylococcus* than that of *Streptococcus,* but the differences in the curves of the four cocci are mostly at the start, there being little difference in the second or the last third of the curves. *Bacillus diphtheriæ* runs a curve which shows two sharp drops and the rest of the curve resembles the curve for *Streptococcus.* The *pyocyaneus* curve resembles that of *B. coli* with the exception that it runs more smoothly than the former one.

There is a rudimentary resemblance between the curve of *B. anthracis* and the general type of all the curves, of which that of *B. coli* may be considered the prototype. *Bacillus tuberculosis* runs a curve of its own, it being the most susceptible of the selected bacteria.

It can be seen that there is no selective action of the chemicals used within the typhoid-dysentery-coli group. *Vibrio choleræ,* on the other hand, is inhibited by cymol and citrus microsporon oil while the typhoid-dysentery-coli group remained unaffected. Allyl alcohol makes an exception, in as much as it inhibited *B. coli* more than it did *B. dysenteriæ.* The same applies to the cocci group, there being only slight quantitative differences between the individual members. Exceptions are allyl alcohol, in favor of *Streptococcus* and against *Pneumococcus,* and anisol and anethol, in favor of *Pneumococcus* and against *Streptococcus.*

The selective action most evident is in respect to *B. tuberculosis* and, to a certain extent, *B. anthracis* (anisol, anethol, pittosporum, and turpentine).

It is realized that individual differences of strains may be responsible for findings which may be at variance with those tabulated in Plate 1, only one strain of each bacterium having been used in these experiments.

In our attempt to utilize practically the semiselective effect of allyl alcohol in favor of *B. dysenteriæ,* we found that the majority of *B. coli* strains were not inhibited to a greater degree than was *B. dysenteriæ,* although some behaved similarly as did the strain originally tested. Furthermore, the selective antiseptic effect was found to be modified by the chemical reaction of the medium which was exposed to the action of allyl alcohol.

SUMMARY

Results of experiments are given concerning the semiselective antiseptic effect of the volatile constituents of essential oils, vegetable oils, and similar volatile compounds toward *B. tuberculosis*, *B. typhosus*, *B. coli*, *B. dysenteriæ*, *Vibrio choleræ*, *B. anthracis*, *B. pyocyaneus*, and Gram-positive and negative pathogenic cocci.

ILLUSTRATION

PLATE 1. Graphs showing the susceptibility of various bacteria to the vapors of certain oils.

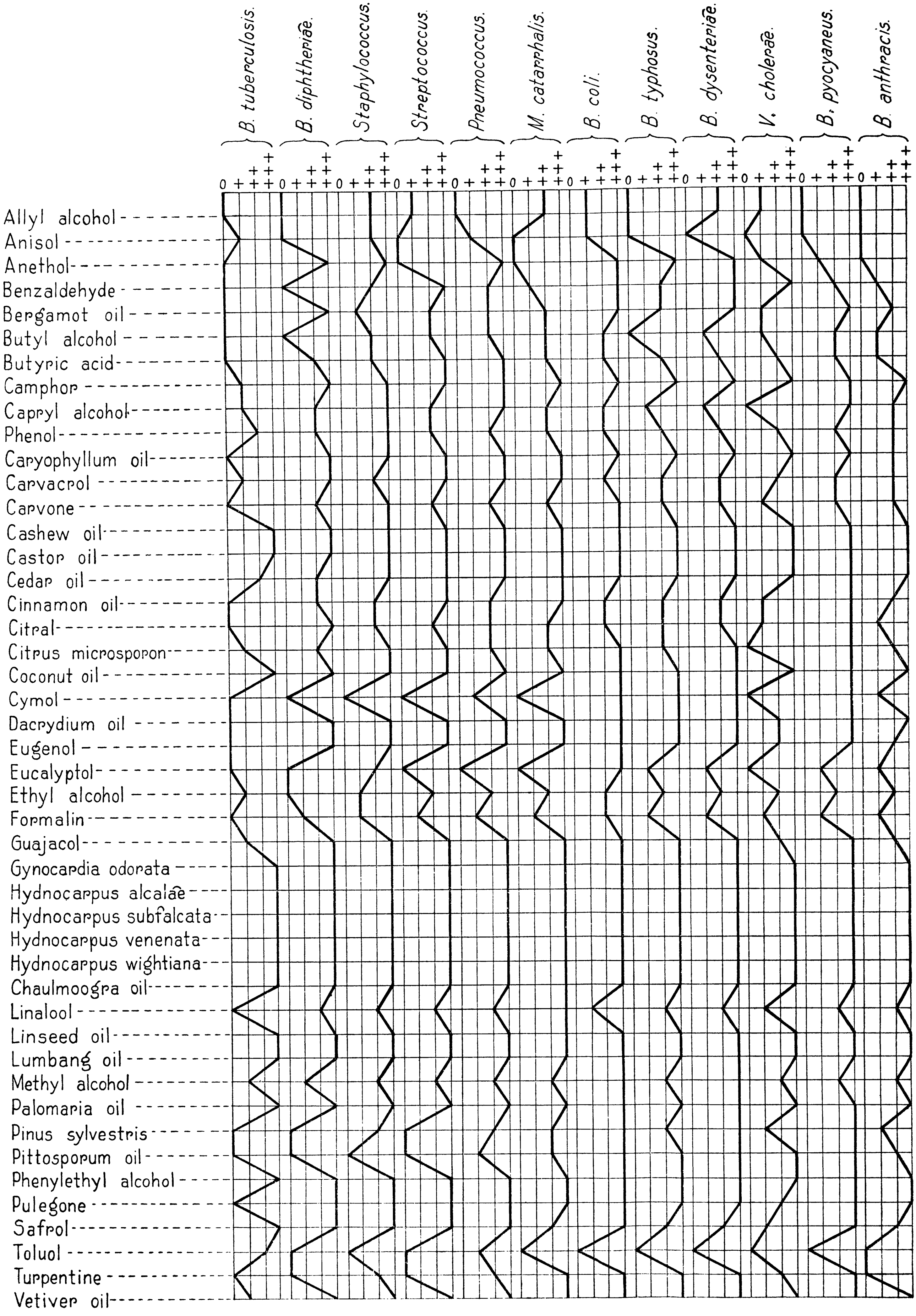

PLATE 1. SHOWING THE SUSCEPTIBILITY OF VARIOUS BACTERIA TO THE VAPORS OF CERTAIN OILS.

SOME FAR EASTERN MUSCIDÆ (DIPTERA)

By J. R. MALLOCH

Of the Bureau of Biological Survey, Washington

The species included in this paper would fall within the generally accepted limits of the family Anthomyiidæ, as none of them have the fourth vein of the wing angularly bent forward at about the middle of its apical section, and the pteropleura, and generally also the hypopleura, is bare. There are, however, no dependable characters for the separation of the families Muscidæ and Anthomyiidæ and, as the former is the oldest name, while I accept *Musca* as the generic name of *Musca domestica* Linnæus and other house flies, I use Muscidæ in a wider sense, covering the entire Anthomyiidæ of authors as well as Muscidæ.

In the Eastern Hemisphere we have a group of genera that have the first longitudinal vein of the wing furnished either above or below, or on both sides, with hairs or setulæ on at least a part of its surface. None of these genera are known to me to occur in the Western Hemisphere, though some others are there which have the same character that are related to this group more or less closely.

In examining specimens for this character students must bear in mind that in numbering the wing veins authors who make use of this system do not take into account the auxiliary vein or subcosta, but commence with the second apparent vein or first branch of the radius.

I present herewith a key for the identification of the described genera that possess hairs or setulæ on the first vein.

Pterocanthus Malloch and *Acanthiptera* Rondani are known only from Europe and are not at all likely to occur in the Philippines. The former is closely related to *Lasiops* Meigen, which genus is confined to northern or mountainous regions. Each contains but one species.

Key to some of the genera of Muscidæ.

1. Arista very short-haired, the longest hairs not nearly as long as width of third antennal segment; first posterior cell of wing not at all narrowed apically .... 2.

Arista with its longest hairs at least as long as width of third antennal segment, or if much shorter the first posterior cell of wing is distinctly narrowed apically, the fourth vein being bent or curved forward at or near apex........................ 3.

2. Hind coxæ with one or more setulose hairs at apex above base of hind femora; hairs on first vein very fine, on underside at middle. **Pterocanthus** Malloch.

Hind coxæ bare at apex above bases of hind femora; hairs on first vein bristlelike, on apical half of upper side............ **Acanthiptera** Rondani.

3. Arista pubescent or short-haired; thorax and abdomen each with conspicuous black spotlike markings on dorsum........ **Heliographa** Malloch.

Arista plumose; thorax and abdomen without conspicuous black spotlike markings .... 4.

4. Lower calyptra normal, not very wide, rounded at apex, inner margin at base not close to base of scutellum; basal abdominal sternite bare. **Xenosina** g. nov.

Lower calyptra broad, almost truncate at apex, the hind outer angle rather sharp, and the inner margin at base almost or quite touching base of scutellum below........................ **Xenosia** **Malloch.**

Genus **HELIOGRAPHA** Malloch

The genotype is *Limnophora tonsa* Stein, described from Java. Other species referable here are *excellens* Stein and *fasciata* Stein, both from New Guinea. There is another species listed in a key to the Indo-Australian species of *Limnophora* by Stein in 1915[1] under the name *aurantiaca* sp. nov., which has apparently not yet been described. It is probable that *Limnophora insignis* Stein from New Guinea may belong here, though the arista is longer-haired than in the other species.

I present a key for the identification of the above-named species taken from Stein's key referred to above.

Key to species of Heliographa Malloch.

1. The black mark on fore margin of thoracic dorsum never extending back as far as suture........................ 2.

The black mark on fore margin of thoracic dorsum extending backward in middle as far as suture........................ 3.

2. Antennæ black; arista distinctly plumose........................ **H. insignis** Stein.

Antennæ yellow; arista at most short-haired............ **H. excellens** Stein.

3. Abdomen largely yellow, with very indistinct paired spots. **H. aurantiaca** Stein.

Abdomen not conspicuously yellow, with distinct fasciform spots........ 4.

4. Arista almost entirely bare; abdomen never yellow at base. **H. tonsa** Stein.

Arista distinctly though short haired; abdomen translucent yellow at base........................ **H. fasciata** Stein.

Of the species mentioned in the key *tonsa* Stein should certainly occur in the Philippines.

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[1] Suppl. Ent. No. 4 (1915) 38.

Genus **XENOSINA** novum

Generic characters as listed in the key. Genotype, *Mydaea morosa* Stein.

Key to species of Xenosina g. nov.

1. Sides of scutellum bare below level of the strong marginal bristles; fore femora entirely yellow; thorax and abdomen black, densely yellowish gray pruinescent; apex of fourth visible tergite rufous yellow.......... 2.
   Sides of scutellum below the strong marginal bristles with some distinct hairs.......... 3.
2. Scutellum nowhere yellowish; smaller form, less than 7 millimeters in length.......... **X. pudica** (Stein).
   Scutellum yellowish on sides and at apex; larger form, over 7 millimeters in length.......... **X. pudica var. rufomarginata** var. nov.
3. Fore femora entirely yellow; thorax and abdomen bluish black, sparsely gray pruinescent; fine hairs on sides of scutellum yellow; large species, 8 to 9 millimeters in length.......... **X. morosa** (Stein).
   Fore femora largely fuscous; thorax and abdomen without blue tinge; fine hairs on sides of scutellum not yellow; smaller species, not over 7 millimeters in length.......... 4.
4. Abdomen translucent yellowish at base.......... **X. flavibasis** sp. nov.
   Abdomen entirely black.......... 5.
5. Legs black, tibiæ and tarsi yellow.......... **X. sparsiseta** (Stein).
   Legs yellow, fore femora more or less infuscated, mid and hind tarsi brownish.......... **X. lauta** (Stein).

Xenosina pudica (Stein).

Very similar to *Xenosia ungulata* (Stein) in color, but the antennæ are brownish yellow, paler at base of third segment, and the palpi are fuscous. Thorax and abdomen as in *ungulata*, apex of fourth visible tergite narrowly rufous yellow.

Structurally similar to *ungulata* except in having the lower calyptra more elongate and rounded at apex, with its inner margin at base well separated from base of scutellum. Frons of male at narrowest part not wider than third antennal segment, orbits setulose on their entire length, the upper setula on each side curved backward. Chætotaxy as in *Xenosia ungulata*.

Occurs in Formosa.

Xenosina pudica var. rufomarginata var. nov.

Differs from the typical form in having the margin of scutellum very noticeably paler than disk, yellowish, and third antennal segment paler. The hypopleura has usually a few distinct hairs on its upper margin in front of spiracle, which are nearly always absent in the typical form, and the size is greater, averaging 8 millimeters as against 6.5.

In both forms the females have sometimes setulose hairs on the undersurface of the first vein of the wing.

Type, male, and allotype, Mount Maquiling, Luzon. One male paratype, Pankullum, Ceylon, March 13, 1891 (*Yerbury:* British Museum); one male, Biserat, Siam, October 17, 1901 (*Robinson and Annandale:* British Museum).

In a previous paper[2] I recorded the second last specimen erroneously as *Xenosia ungulata* (Stein).

Xenosina morosa (Stein).

I have previously[2] recorded this species as belonging to *Xenosia.* A brief description was given of the species, which is known only from Ceylon.

Xenosina flavibasis sp. nov.

Male.—Black, slightly shining, densely gray pruinescent. Antennæ brownish yellow; palpi fuscous. Thorax very indistinctly quadrivittate. Abdomen yellow at base, the pale color extending usually to apex of second visible tergite, second and third tergites each with a pair of very large, poorly defined dark marks which are separated by a narrow stripe of gray pruinescence, fourth tergite more densely gray pruinescent than the others. Legs tawny yellow, fore femora more or less broadly infuscated. Wings, calyptræ, and halteres yellowish.

Slenderer than *pudica,* the general structure similar, but the hairs on the frontal orbits are longer and there is a greater distance between the upper backwardly directed setulæ and the setulæ in front of them than in that species.

Female.—Abdomen glossy black, less pruinescent and less broadly yellowish at base than in the male.

Frons about one-fourth of the head width; palpi broadened; lower surface of first wing vein usually setulose in the middle.

Length, 5.5 to 6 millimeters.

Type, male, allotype, and one male paratype, Chosokei, Formosa (*Sauter*); one female paratype, Tao Tsui Kutsu, Formosa (*Sauter*). Specimens in collection of Deutsches Entomolgisches Institut, Berlin.

Xenosia lauta (Stein).

Xenosia sparsiseta (Stein).

Both species occur in Formosa. I have seen *lauta* but not *sparsiseta.*

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[2] Ann. & Mag. Nat. Hist. 10 (1922) 574.

PARANDES, A NEW CIXIID GENUS (HOMOPTERA, FULGOROIDEA)

By F. Muir

Of the Hawaiian Sugar Planters' Experiment Station, Honolulu

ONE TEXT FIGURE

Genus **PARANDES** novum

This genus is close to *Andes* Stål and differs only in the shape and size of the front coxæ, which are produced and rounded on the outer edge of the apical half (fig. 1, *a* and *b*). Head in profile with the junction of vertex and frons slightly angular and slightly produced. Hind tibiæ without spines. Sc, R, and M arising from basal cell, not forming a stalk; R with three apical branches; M with five, as in *Andes,* no Cu 1 b.

Type *Parandes simplus* sp. nov.

Parandes simplus sp. nov. Text fig. 1, *a*.

Female.—Length, 4.3 millimeters; tegmen, 6.5. Brown; lateral carinæ of frons lighter; front coxæ dark brown, the apical half shiny black; front and middle legs with a longitudinal dark mark; abdominal tergites darker than sternites; mesonotum darker than pronotum, shiny. Tegmina hyaline, slightly tinged with brown, more distinctly over clavus and Cu; stigma brown; veins light brown, costa darker brown; granules sparse, minute, same color as veins. Wings hyaline, slightly tinged with brown, veins brown.

Ovipositor twice as long as pygofer; pygofer a little longer than wide; anal segment not as long as pygofer, a little longer than wide, apex rounded.

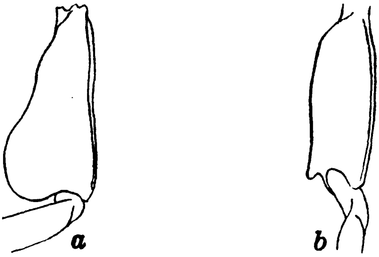

FIG. 1. *a, Parandes* g. nov., front coxa; *b, Andes* Stål, front coxa.

West Borneo, Mowong (*F. Muir*), one female. Type No. 1134.

ILLUSTRATION

TEXT FIGURE

FIG. 1. *a, Parandes*, g. nov., front coxa; *b, Andes* Stål, front coxa. 513

DESCRIPTIONS OF THREE NEW HYMENOPTERA FROM THE PHILIPPINE ISLANDS

By Robert M. Fouts

Of Washington, D. C.

TWO TEXT FIGURES

The new Hymenoptera described in this paper were given to me to study by S. A. Rohwer who had received them for identification from Prof. C. F. Baker.

BETHYLIDÆ

Genus **ROHWERIA** novum

Head triangular seen from in front, eyes large, oval, pubescent; head shaped as in *Scelio,* prominent in the middle of the face, anterior part sharply declivous; ocelli present, rather large; antenna 12-jointed; scape with short scattered pubescence; pronotum slightly narrowed anteriorly, not margined at sides, without any impressions; parapsidal grooves complete, turning sharply outwardly, their ends running into small depressions; propodeum about as long as pronotum, sharply declivous posteriorly, margined at top of declivity; scutellum transverse, without fovea; metanotum as long as scutellum, triangular, projecting into dorsal face of propodeum more than halfway to posterior declivity; dorsal median line of propodeum therefore very short, scarcely as long as metanotum; wings fully developed; no parastigma; radius curved, not quite attaining wing margin, its

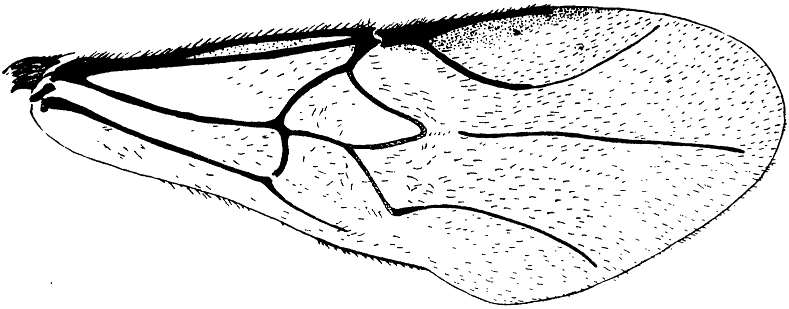

FIG. 1. *Rohweria metallica* g. et sp. nov., wing of type female.

distal half pale, without inner tube, about twice as long as basal; median and submedian cells closed; brachius complete to subdiscoideus but very pale; first abscissa of cubitus pale but distinct, second abscissa absent; cubitus otherwise distinct, not quite attaining wing margin; subdiscoideus distinct, not quite attaining wing margin; brachius short and indistinct; nervulus curved outwardly; pterostigma linear; metacarpus about as long as basal; legs not especially robust; thorax (except propodeum) metallic; abdomen obovate, pointed apically, six-segmented.

Type, *Rohweria metallica* sp. nov.

Runs to *Mesitius* in Kieffer's key.[1] Differs principally in having 12-jointed antenna.

The genus is named for my friend Mr. S. A. Rohwer, specialist in Hymenoptera in the United States National Museum.

Rohweria metallica sp. nov. Figs. 1 and 2.

Female.—Length, 4 millimeters. Head as wide as thorax across tegulæ, about twice as wide as long seen from above; frons with two broad shallow grooves accommodating the scapes, the grooves margined externally and separated internally by a flat polished line; each groove is about two and one-half times as long as wide and is transversed by closely and regularly placed raised carinæ; thorax twice as long as wide, somewhat depressed, closely beset by fine, moderately long, grayish hairs; metallic blue (except the propodeum); mesonotum convex medially, narrowed posteriorly, shining, strongly punctate; scutellum less than twice as wide as long, the sides oblique, straight; metanotum triangular, as long as scutellum, longer than wide, more finely punctate than scutellum which is in turn more finely punctured than mesonotum or pronotum; mesopleura strongly punctured, the pits very close together and arranged in more or less definite linear fashion; propodeum deeply excavated and with irregular small carinæ laterally; dorsally the propodeum is marked off as in the accompanying illustration; although strongly sculptured it is not opaque or even subopaque; posteriorly

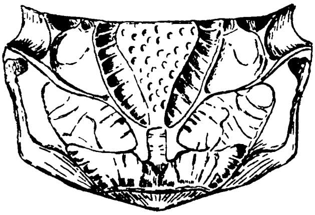

FIG. 2. *Rohweria metallica* g. et sp. nov., propodeum of type female.

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[1] Das Tierreich 44 (1916) 284.

the propodeum is divided into six well-defined areas, as the illustration will show; the first tergite has well-defined anterior and superior faces, the former smooth, the latter finely and sparsely punctate; this segment is almost destitute of pubescence, in contrast to the following ones which are covered rather abundantly with hairs; superior face of first tergite about two and one-half times as wide as long; second tergite about three-fifths as long as wide, finely punctulate, the sides slightly oblique, nearly straight; remaining segments short pubescent, without sculpture; the last one densely pubescent; coxæ stramineous, brown posteriorly; anterior and middle femora mostly brownish, yellow basally; posterior femora blackish externally, yellowish internally; middle tibiæ yellow, posterior light brown; hind tarsi black.

Type locality.—Sibuyan Island, Philippines.

Described from one female received from C. F. Baker.

Type.—Catalogue No. 26541, United States National Museum.

Loboscelidia nigricornis sp. nov.

Male.—Length, 3 millimeters. Runs to *Loboscelidia defecta* Kieffer in my key to the species.[2] It differs from that species as follows: Larger, darker coloring, less extensive maculation of wings, there being only one blackish band along radius; antenna blackish instead of light brown; mesonotum a little wider than long, not quadrate; scutellum separated from axillæ by sharply defined grooves (not present in *defecta*); the last joint of antenna is four times as long as wide; it is three times as long as wide in *defecta.*

Type locality.—Surigao, Mindanao.

Described from one male received from C. F. Baker.

Type.—Catalogue No. 26542, United States National Museum.

The specimens used for comparison were received some time ago from C. F. Baker and determined by me as *L. defecta* Kieffer.

Loboscelidia rufa sp. nov.

This species is closely allied to *Loboscelidia philippinensis* and *L. maculipennis.* The former is characterized by the form of the radius, which is sharply bent distally and enters the subcosta at a right angle. The following description is an enumeration of the differences existing between *L. rufa* and *L. maculipennis:*

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[2] Philip. Journ. Sci. 20 (1922) 619.

Sex not determinate, antennæ (except scapes) and abdomen being missing; length, about 4 millimeters; frons leathery in appearance, very finely roughened; cheeks and malar space not furnished with club-shaped hairs; dorsal cervical plate and membranes as in *philippinensis* but the former slightly wider in proportion to its length; axillæ separated from scutellum by grooves; metanotum covered with many parallel longitudinal carinæ; cubitus very clearly marked proximad, issuing from the middle of basal nervure; radius oblique, five times as long as metacarpus, the latter about as long as subcosta beyond radius; maculations of wings sharply defined, the radial being very dark; membranes on legs as in *L. philippinensis;* body dark rufous.

Type locality.—Sibuyan Island, Philippines.

Described from one specimen received from C. F. Baker and under his No. 18582.

Type.—Catalogue No. 26543, United States National Museum.

ILLUSTRATIONS

TEXT FIGURES

FIG. 1. *Rohweria metallica* g. et sp. nov., wing of type female.
2. *Rohweria metallica* g. et sp. nov., propodeum of type female.

INTERNAL METAZOAN PARASITES COLLECTED FROM RUMINANTS IN THE PHILIPPINE ISLANDS

By BENJAMIN SCHWARTZ

Of the Zoölogical Division, Bureau of Animal Industry, United States Department of Agriculture, Washington

TWO PLATES

INTRODUCTION

Heretofore comparatively few parasites of ruminants in the Philippine Islands have been recorded, the published records appearing in several different publications. In this paper all the previously published records together with a comparatively large number of new records of parasites of Philippine ruminants are brought together in order to establish a better starting point for further study of the parasitic fauna of these animals.

TREMATODA

Trematodes occurring in ruminants in the Philippine Islands belong to two groups; namely, Amphistomata and Distomata.

Group AMPHISTOMATA Rudolphi 1801

Amphistomata are digenetic trematodes having two suckers, the anterior surrounding the mouth and the posterior terminal or ventro-terminal behind the genitalia. Excretory pore opening dorsally near hind end; testes generally in front of ovary. Flukes thick, more or less circular in cross section.

The three families of Amphistomata are all represented in material from Philippine ruminants and can be distinguished as follows:

Key to families of Amphistomata.

1. Body usually flattened and divided into anterior and posterior portions; ventral pouch absent........ **Gastrodiscidæ.**
   Body usually conical and not divided into anterior and posterior portions........ 2.
2. Ventral pouch absent........ **Paramphistomidæ.**
   Ventral pouch present........ **Gastrothylacidæ.**

Family GASTRODISCIDÆ Stiles and Goldberger, 1910

Genus **HOMALOGASTER** Poirier, 1883

In the genus *Homalogaster* the anterior portion of the body is large and flat and the posterior portion is smaller and spherical.

Homalogaster poloniae (Poirier, 1883).

This is the only described species of the genus, *Homalogaster philippinensis* Stiles and Goldberger, 1910, being a synonym, according to Maplestone.(4)

The species was described by Stiles and Goldberger,(10) from the cæcum of *Bos taurus* from the Philippines under the name *H. philippinensis.*

Family PARAMPHISTOMIDÆ Fischoeder, 1901

Genus **PARAMPHISTOMUM** Fischoeder, 1901

The absence of oral diverticula places the genus in the subfamily Paramphistominæ. The genus proper is characterized by the absence of a genital sucker which distinguishes it from *Cotylophoron* (the only other genus of Paramphistominæ).

Paramphistomum explanatum (Creplin, 1847).

Paramphistomum explanatum (Plate 1, fig. 1) can be distinguished from other species of the genus parasitic in mammalia by the character and position of the testes. In the type species of the genus, *P. cervi,* as well as in several other species, the testes lie one directly behind the other, whereas in *P. explanatum* the testes are diagonally situated, one overlapping the other. *Paramphistomum explanatum* can be distinguished from *P. buxifrons,* a species in which the testes are also diagonal in position, in that in the latter the testes are not lobed and Laurer's canal is anterior to the excretory pore, whereas in *P. explanatum* the testes are lobed and Laurer's canal is posterior to the excretory pore.

Maplestone,(4) in a recent revision of the Amphistomata of mammals, includes four former species of the genus *Paramphistomum;* namely, *P. crassum* Stiles and Goldberger, 1910; *P. cauliorchis* Stiles and Goldberger, 1910; *P. fraternum* Stiles and Goldberger, 1910; and *P. siamense* Stiles and Goldberger, 1910, in *P. explanatum.*

Specimens of *P. explanatum*[1] were collected by me in Manila from carabaos (*Bos kerabau*) and from Indian cattle (*Bos indicus*).

Location of specimens, the paunch.

Paramphistomum anisocotylea Faust, 1920.

This species was described by Faust from Philippine material collected in Manila from an Indian buffalo (*Bubalus bubalus*). This fluke is ovoid, 6 to 6.3 millimeters long and 3.5 to 4 millimeters wide. It can be readily recognized by its conspicuous acetabulum, which is greater than half of the animal's length. The testes lie in tandem arrangement and are not lobed.

This species was collected by me from a cow (presumably *Bos taurus*) at the Azcarraga abattoir in Manila.

Genus **COTYLOPHORON** Stiles and Goldberger, 1910

This genus differs from the genus *Paramphistomum* by the presence of a genital sucker in the former.

Cotylophoron cotylophorum (Fischoeder, 1901).

Specimens of this species (Plate 1, fig. 2) from the Philippines were found in the helminthological collection of the Bureau of Animal Industry, Washington, D. C. The material was sent by Dr. W. H. Boynton from Manila in 1914. Collected from the rumen of *Bos taurus* and *Bos kerabau*. Identified generically in 1914 by Dr. M. C. Hall.

Maplestone(4) considers *Cotylophoron indicum* Stiles and Goldberger, 1910, to be a synonym of *C. cotylophorum*.

Family GASTROTHYLACIDÆ Stiles and Goldberger, 1910

Genus **GASTROTHYLAX** Poirier, 1883

One species of this genus from the Philippines is listed in the helminthological collection of the Bureau of Animal Industry, Washington, D. C. The specimens were sent by Dr. W. H. Boynton from Manila in 1914. Collected from the rumen of *Bos taurus* and *Bos kerabau*. Determined generically by Dr. M. C. Hall in 1914.

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[1] Specific determination by Dr. E. A. Chapin, zoölogical division, Bureau of Animal Industry.

The type hosts of this genus are *Bos indicus* and *Bos kerabau*, from Asia.

Maplestone (4) regards *Gastrothylax compressus* Brandes, 1898, as a synonym of *Gastrothylax crumenifer* (Creplin, 1847), the type species, which is therefore the only species of the genus, and to it the Philippine material doubtless belongs (Plate 1, fig. 3).

This genus is distinguished from the other genera of the family by the uterus crossing from one side of the body to the other near the middle of the worm.

Genus **FISCHOEDERIUS** Stiles and Goldberger, 1910

The genus *Fischoederius* differs from the other genera in the family Gastrothylacidæ in that the uterus lies in the center of the body for its whole length and one testis is dorsad of the other.

Fischoederius elongatus (Poïrier, 1883).

In this species (Plate 1, fig. 4) the gut cæca never extend farther than just behind the middle of the body, whereas in a closely related species (*F. cobboldi* Poirier, 1883) the gut cæca extend to at least the testes.

Three formerly described species of this genus, *F. fischoederi* Stiles and Goldberger, 1910; *F. siamensis* Stiles and Goldberger, 1910; and *F. ceylonensis* Stiles and Goldberger, 1910, are included by Maplestone (4) in *F. elongatus*.

Specimens of this species[2] were collected by me from the rumen of Indian cattle (*Bos indicus*) in Manila.

Group DISTOMATA Retzius, 1872

These digenetic flukes have a forked gut and two suckers; the posterior sucker (acetabulum) is ventral in position and always separated from the hind end of the body by at least a part of the genitalia. Two species, both belonging to the genus *Fasciola*, have been found in the Philippine Islands.

Genus **FASCIOLA** Linnæus, 1758

Two species of this genus occur in ruminants, and both are found in the Philippine Islands.

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[2] Specific determination by Dr. E. A. Chapin, zoölogical division, Bureau of Animal Industry.

Fasciola hepatica Linnæus, 1758.

This is the well-known liver fluke of cattle, sheep, and other ruminants, and is of very common occurrence in the Philippine Islands.

I have collected specimens of this species from the liver of native sheep (*Ovis aries*), native cattle (*Bos taurus*), Indian cattle (*Bos indicus*), native goats (*Capra hircus*), and from the Indian buffalo (*Bubalus bubalus*) in Los Baños and Manila.

Fasciola gigantica Cobbold, 1886.

This species is recorded from the Philippines by Faust(2) from the liver of an Indian buffalo (*Bubalus bubalus*). It is allied to *Fasciola hepatica* but is differentiated from that species by its elongated body, with almost parallel sides, and its shorter cephalic cone.

CESTODA

Cestodes occur in ruminants as larval forms and as adults. Larval cestodes in ruminants belong to the family Taeniadæ Baird, 1853, of which two species have been encountered in Philippine ruminants. Adult cestodes in ruminants belong to the Anoplocephalidæ Kholodkovsky, 1902, of which three species have been encountered in the Philippines.

LARVAL CESTODES

Cysticercus bovis is found only rarely in cattle slaughtered for food at Pandacan, Manila. The occurrence of *Cysticercus bovis* in various parts of the Philippine Islands may be inferred from the occurrence of the adult tapeworm (*Taenia saginata*) in the native population throughout the Archipelago.

This larval tapeworm was first recorded from the Philippines by Schwartz and Tubangui.(9)

Echinococcus, the larval stage of *Echinococcus granulosus* (Goeze, 1782), parasitic in the intestine of dogs, was found in the heart of a cow (*Bos taurus*) autopsied in Los Baños and in the lungs of an Indian buffalo (*Bubalus bubalus*) autopsied in Manila.

Reported from the Philippines by Schwartz.(5)

ADULT CESTODES

Adult cestodes from cattle and sheep belong to the family Anoplocephalidæ, which may be defined as cestodes that possess neither rostellum nor hooks, having segments that are wider than long, and possessing a transverse uterus.

Genus **MONIEZIA** R. Blanchard, 1891

Three species of this genus, which is characterized by a double uterus and double genital pores, were found in the Philippine Islands.

Moniezia planissima Stiles and Hassall, 1893.

In this species the interproglottidal glands are linear (Plate 1, fig. 5). The entire strobila may attain a length of 1 to 2 meters.

Collected from a cow (presumably *Bos taurus*) in Mindanao.

Moniezia expansa (Rudolphi, 1805).

In this species (Plate 1, fig. 6) the interproglottidal glands are circular. The testicles are arranged in a quadrangle (rarely in a triangle, according to Stiles, 1898).

Collected from native sheep (*Ovis aries*) in Manila and from cattle (*Bos taurus*) in Mindanao. Reported by Schwartz.(5)

Moniezia trigonophora Stiles and Hassall, 1893.

This species differs from the former species in the arrangement of the testicles, which are usually grouped in the form of two triangles (Plate 1, fig. 7).

Collected once from native sheep (*Ovis aries*). Reported by Schwartz.(5)

NEMATODA

Nematodes occurring in Philippine ruminants, so far as our present knowledge goes, belong to the following superfamilies: Ascaroidea Railliet and Henry, 1915, represented in the Philippines by *Ascaris vitulorum;* Strongyloidea Weinland, 1858, represented in the Philippines by *Haemonchus contortus, Proteracrum columbianum, Proteracrum* species, *Monodontus phlebotomus,* and *Syngamus laryngeus;* Filarioidea Weinland, 1858, represented in the Philippines by *Setaria labiato-papillosa, Thelazia rhodesi,* and *Elaeophora poeli;* and Trichuroidea Railliet, 1916, represented in the Philippines by *Trichuris ovis.*

Ascaris vitulorum Goeze, 1782.

This species (Plate 2, fig. 1) was first recorded from the Philippines by Schwartz(6) from carabao calves (*Bos kerabau*) at Los Baños. Specimens were also collected in Mindanao from

Bos taurus. The importance of this parasite has been emphasized by me in previous papers.(6, 7, 8)

Proteracrum columbianum (Curtice, 1890).

This is the nodular worm of sheep and goats and is of very common occurrence in the large intestine of these animals in the Philippine Islands (Plate 1, figs. 9, 10, and Plate 2, fig. 4). The larval stages of this parasite occur in nodules that are most commonly located in the walls of the cæcum. Nodules may also occur in other parts of the intestine and in the abdominal viscera, particularly in the liver. I have frequently encountered nodular disease of the intestine in sheep and goats slaughtered in the Azcarraga abattoir in Manila.

This species was recorded from the Philippines by Boynton and Wharton(1) from a goat from Minalabac, Camarines Sur. Collected by me from native goats (*Capra hircus*) and native sheep (*Ovis aries*) in Manila.

Proteracrum sp., Boynton and Wharton, 1916.

Boynton and Wharton(1) refer to a species of *Oesophagostomum* (*Proteracrum*) from a cow from Minalabac, Camarines Sur, which differs in several respects from *Proteracrum radiatum.*

Monodontus phlebotomus Railliet, 1900.

This is the cattle hookworm (Plate 2, figs. 2, 5) and was reported from the Philippines by Boynton and Wharton(1) from *Bos taurus* at Minalabac, Camarines Sur. I did not find this species in the course of my post-mortem work in Manila and Los Baños.

This parasite has been associated with a disease of cattle in Florida, in the United States, known as "salt sick," characterized by anæmia, emaciation, constipation, and other symptoms of common occurrence in parasitic infestations.

Haemonchus contortus (Rudolphi, 1803).

This is the twisted wire worm of ruminants (Plate 1, fig. 8, and Plate 2, fig. 3) and was reported from a goat and a cow (*Bos taurus*) from Minalabac, Camarines Sur, by Boynton and Wharton.(1) Collected by me from the fourth stomach of goats (*Capra hircus*) and sheep (*Ovis aries*) in Manila and Los Baños.

This parasite feeds upon the blood of its host and in cases of heavy infestation it produces a strongly marked anæmia, dropsy, emaciation, and digestive disturbances.

Boynton and Wharton(1) reported an outbreak in Minalabac, Camarines Sur, of a parasitic disease in cattle and goats, resulting in many deaths; as far as can be judged from their description, this disease was due largely to gross infestation with stomach worms (*Haemonchus contortus*) and hookworms (*Bustomum phlebotomum*). Autopsies revealed emaciation and anæmia, catarrhal inflammation of the intestines, and small petechiæ in the lining of the stomach and intestine, due undoubtedly to the bites of the worms.

Boynton and Wharton(1) report a species of nematode from the stomach of *Bos taurus* from Minalabac, Camarines Sur. From the brief description given of this worm it is impossible to assign it to any known species from ruminants.

Syngamus laryngeus Railliet, 1899.

This species was reported by Hall(3) from a cow (presumably *Bos taurus*) and from the carabao (*Bos kerabau*) from the Philippines. These parasites occur in the larynx and are attached to the laryngeal mucosa.

Thelazia rhodesi (Desmarest, 1827).

These worms are 8 to 12 millimeters long (male) and 12 to 18 millimeters long (female). The cuticle is conspicuously cross striated which gives it a denticulated appearance. Buccal capsule present; œsophagus relatively long, 540 to 600 μ. Male has 3 pairs of preanal and 14 pairs of postanal papillæ. Spicules 750 μ and 850 μ long, respectively, by 115 to 130 μ wide. Vulva 900 to 1,000 μ from mouth, surrounded by a granular zone. Heretofore this species was recorded only from France, Egypt, and Sumatra, in *Bos taurus*.

Collected by me from the eyes of cattle (*Bos taurus*) at Los Baños.

Parasites belonging to the genus *Thelazia*, of which several species have been described from cattle, produce a verminous ophthalmia in these animals that is chiefly characterized by a pronounced conjunctivitis. The following symptoms have been observed in affected animals: Lacrymation, vascular injection of the conjunctiva, puffed eyelids, and photophobia. The eyes of affected animals are very sensitive and are often closed.

Setaria labiato-papillosa (Alessandrini, 1838).

Males of this species are 4 to 6 centimeters long and terminate in a spirally rolled tail; females are 6 to 12 centimeters long with a less-pronounced spiral tail.

Reported by Boynton and Wharton(1) from the abdominal cavity and lungs[3] of a cow from Minalabac, Camarines Sur. Collected by me from the abdominal cavity of carabaos (*Bos kerabau*), cattle (*Bos taurus*), Indian cattle (*Bos indicus*), and Indian buffalo (*Bubalus bubalus*) in Manila and Los Baños, and from a cow in Mindanao.

This species appears to be common in Philippine cattle and carabaos.

Elaeophora poeli (Vryburg, 1897).

These parasites occur in the posterior portion of the thoracic aorta. The males occur in nodules and the females are attached in nodules, the body being largely free in the lumen of the vessels.

Males are 4.5 to 7 centimeters long and females, 4 to 30.

This parasite was sent by Dr. W. H. Boynton in 1914 to the zoölogical division of the Bureau of Animal Industry and was determined by Dr. M. C. Hall.

Collected by Boynton from the aorta of *Bos taurus* and *Bos kerabau* in Manila.

I examined specimens of this species from cattle in Manila, through the courtesy of Dr. S. Youngberg.

Trichuris ovis (Abilgaard, 1795).

This is the common whipworm of ruminants (Plate 2, fig. 6) and was first reported from the Philippines by Boynton and Wharton(1) from the cæcum of a cow from Minalabac, Camarines Sur. Specimens were collected by me from the cæca of native sheep (*Ovis aries*) and native goats (*Capra hircus*) at

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[3] Boynton and Wharton make the following remarks in connection with their findings in the course of an autopsy on a cow: "Worms were found in the bronchioles of the lungs, and there was a slight pneumonia in the left principal lobe." It seems fair to assume that the "worms" in question were lungworms (*Dictyocaulus*) although they do not include *Dictyocaulus* in their helminthological findings. *Setaria labiato-papillosa* is not known to occur in the bronchioles of the lungs.

Manila. This species is very common in sheep and goats slaughtered at Manila. Specimens of this species from cattle (*Bos taurus*) were received from Mindanao.

SUMMARY

In the following summary the species of parasites from ruminants in the Philippine Islands are arranged according to their hosts:

CATTLE (BOS TAURUS)

Homalogaster poloniae.
Paramphistomum anisocotylea.
Cotylophoron cotylophorum.
Gastrothylax crumenifer.
Fasciola hepatica.
Cysticercus bovis.
Echinococcus.
Moniezia planissima.
Moniezia expansa.
Ascaris vitulorum.
Proteracrum species.
Monodontus phlebotomus.
Haemonchus contortus.
Syngamus laryngeus.
Thelazia rhodesi.
Setaria labiato-papillosa.
Elaeophora poeli.
Trichuris ovis.

INDIAN CATTLE (BOS INDICUS)

Paramphistomum explanatum.
Fischoederius elongatus.
Fasciola hepatica.
Setaria labiato-papillosa.

CARABAO (BOS KERABAU)

Paramphistomum explanatum.
Cotylophoron cotylophorum.
Gastrothylax crumenifer.
Ascaris vitulorum.
Syngamus laryngeus.
Setaria labiato-papillosa.
Elaeophora poeli.

INDIAN BUFFALO (BUBALUS BUBALUS)

Paramphistomum anisocotylea.
Fasciola hepatica.
Fasciola gigantica.
Echinococcus.
Setaria labiato-papillosa.

SHEEP (OVIS ARIES)

Fasciola hepatica.
Moniezia expansa.
Moniezia trigonophora.
Proteracrum columbianum.
Haemonchus contortus.
Trichuris ovis.

GOAT (CAPRA HIRCUS)

Fasciola hepatica.
Proteracrum columbianum.
Haemonchus contortus.
Trichuris ovis.

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ILLUSTRATIONS

PLATE 1

FIG. 1. *Paramphistomum explanatum* (Creplin, 1847). From Fischoeder (1904) fig. 1.

2. *Cotylophoron cotylophorum* (Fischoeder, 1901). From Fischoeder (1903) fig. 37.

3. *Gastrothylax crumenifer* (Creplin, 1847). From Fischoeder (1903) fig. 44.

4. *Fischoederius elongatus* (Poirier, 1883); section of worm showing ventral pouch, *vp*. From Stiles and Goldberger (1910) fig. 2.

5. *Monieza planissima* Stiles and Hassall, 1893; sexually mature segment. After Stiles (1898) fig. 113.

6. *Moniezia expansa* (Rudolphi, 1805); sexually mature segment. After Stiles (1898) fig. 118.

7. *Moniezia trigonophora* Stiles and Hassall, 1893; sexually mature segment. After Stiles (1898) fig. 121.

8. *Haemonchus contortus* (Rudolphi, 1803); anterior end of body. After Ransom (1911) fig. 34.

9. *Proteracrum columbianum* (Curtice, 1890); anterior end of body. After Ransom (1911) fig. 19.

10. *Proteracrum columbianum* (Curtice, 1890); posterior end of body of male. After Ransom (1911) fig. 20.

PLATE 2

FIG. 1. *Ascaris vitulorum* Goeze, 1782; one-half natural size. Original.

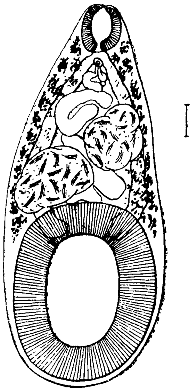
2. *Monodontus phlebotomus* Railliet, 1900; anterior end. From Ransom (1911) fig. 7.

3. *Haemonchus contortus* (Rudolphi, 1803); posterior end of body of male. After Ransom (1911) fig. 35.

4. *Proteracrum columbianum* (Curtice, 1890); posterior end of female. After Ransom (1911) fig. 22.

5. *Monodontus phlebotomus* Railliet, 1900; bursa of male. From Ransom (1911) fig, 8.

6. *Trichuris ovis* (Abilgaard, 1795); male and female. From Ransom (1911).



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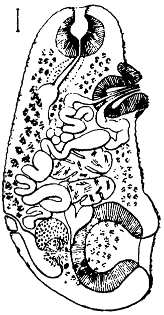

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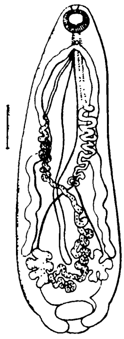

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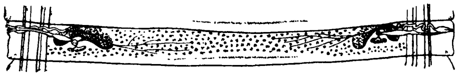

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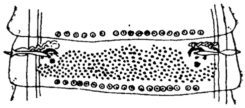

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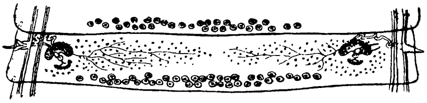

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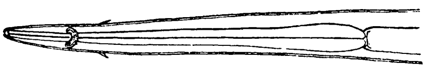

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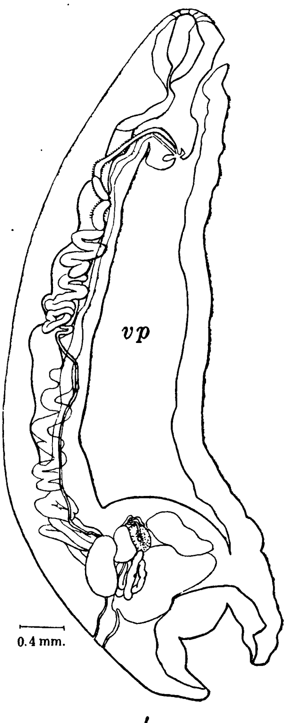

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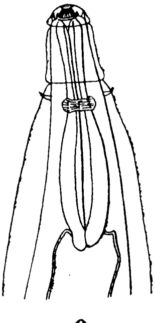

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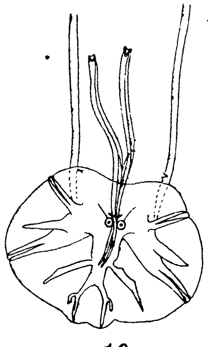

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PLATE 1.

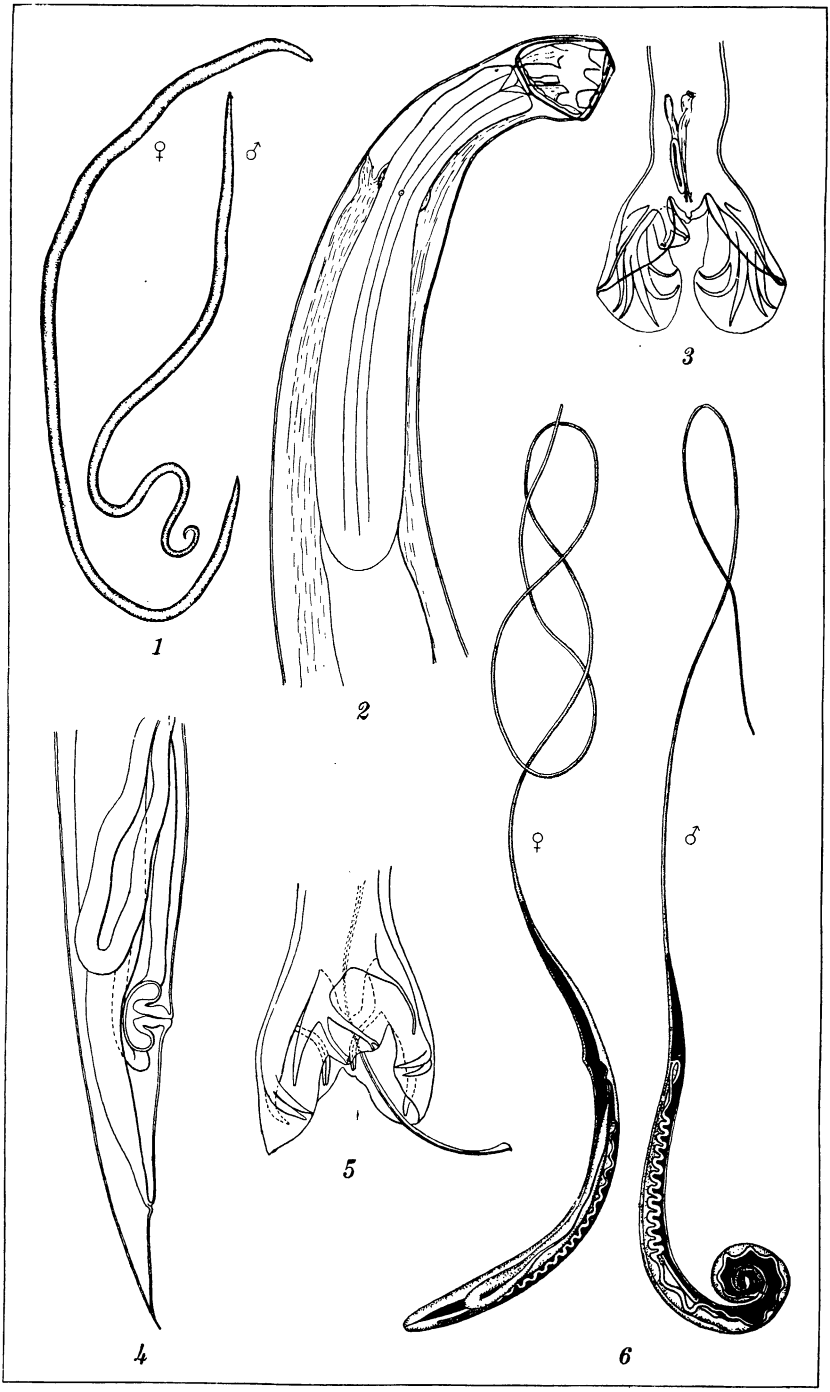

PLATE 2.

UNIV. OF MICH.

DIE TENEBRIONIDEN (COLEOPTERA) DES INDO-MALAYISCHEN GEBIETES, UNTER BERUECKSICHTIGUNG DER BENACHBARTEN FAUNEN, III

DIE GATTUNGEN BRADYMERUS, CHAETOPSIA, DANODEMA, UND DICRAEOSIS

Von Hans Gebien
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EINE TAFEL

Genus **BRADYMERUS** Perroud

Bradymerus Perroud, Ann. Soc. Linn. Lyon (1864) 110.

Die Synonymie dieser Gattung liegt sehr im Argen und die bei mir frühere angegebene Aufzählung der Arten [1] bedarf zahlreicher Verbesserungen, Auslassungen, und Zusätze. Die als Opatride beschriebene Gattung *Isostira* gehört nach brieflicher Mitteilung von Herrn Blair hierher, wie die Typen ausweisen; eine Art, *aspericollis,* ist aus der Gattung *Boletophagus* hierher zu nehmen; und eine beträchtliche Zahl neuer Arten kommt hinzu. Dem entgegen sind mehrere der Arten von Fairmaire Opatriden und gehören zur Gattung *Gonocephalum;* das sind die folgenden: *Bradymerus bidentulus* ist *Gonocephalum minusculum,* und *B. modestus* ist dieser Art ausserordentlich nahe verwandt. Ich verdanke diese Feststellung ebenfalls Herrn Blair. Nach meinen Untersuchungen sind aber auch *B. alaticollis* Fairmaire und *rugatulus* *Gonocephalum*-Arten, und *B. spinicollis* gehört vielleicht ebenfalls dazu, denn der ausgerandete Clypeus, ein Merkmal das für die Opatriden massgebend ist, verbietet eine Vereinigung mit *Bradymerus.* Auch als Synonyme zu andern *Bradymerus*-Arten fällt eine Anzahl Arten aus. Durch alle diese Aenderungen wird der Katalog der Gattung so sehr umgestaltet dass es das Einfachste ist einen neuen hier aufzustellen, was am Schlusse der Artbeschreibungen für diese Gattung erfolgen soll.

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[1] Col. Cat. pars 28 (1910–1911) 356.

Auch die Gattungsbeschreibung die Perroud gegeben hat ist trotz ihrer Ausführlichkeit unzulänglich, denn sie ist auf eine einzige Art zugeschnitten. Eine Neubeschreibung ist also dringend erforderlich.

Beschreibung der Gattung.—Die meisten Arten sehen Täuschend den Arten der Gattung *Gonocephalum* ähnlich, von denen sie sich sofort durch das abgeschnittene Epistom unterscheiden. Geflügelt, parallelseitig, meist braunschwarz, oder (einziges Beispiel für die Boletophagiden) metallisch. Kopf ungehörnt, Augen ungeteilt, durch die Wangen mehr oder minder stark eingeengt, Augenfalten und Augenfurchen, wenn vorhanden, unauffällig. Die Wangen sind entweder schmäler als die Augen, oder lappenförmig oder winklig verbreitert, Epistom gerade abgestutzt. Fühler schlank, 11-gliedrig, Glied 3 verlängert, die letzten drei, fünf, oder sechs Glieder bilden eine Keule. Mentum quer, gekielt, Unterkopf ohne Fühlerfurche, die Mundteile sind also nicht erhaben, sondern liegen mit dem übrigen Unterkopf in einer Ebene. Endglied der Palpen oval, Mandibeln aussen tief gefurcht, am Ende gespalten.

Pronotum quer, an den Seiten verflacht, scharf gekantet, oft gekerbt, Hörner fehlen in beiden Geschlechtern, sehr selten sind schwache Höcker vorhanden.

Flügeldecken parallelseitig, flach, Rand ungekerbt, grosse Höcker fehlen, doch finden sich oft kleine Körnchen, die Zwischenräume sind meist scharf gekielt, der siebente, achte, oder neunte Zwischenraum ist fast immer scharf kielförmig entwickelt und läuft in die Spitze, die andern einschliessend.

Prosternum ungekielt, hinten fast immer niedergebogen, Mittelbrust ohne Kiele und Zapfen, vorn ausgeschnitten oder eingedrückt, Hinterbrust lang, Abdomen ohne Auszeichnung. Schenkel ungezähnt, Schienen hinten mit oder ohne Kiel.

Die Gattung *Bradymerus* enthält schon jetzt so zahlreiche Arten dass eine Aufteilung in mehrere Gattungen sehr erwünscht wäre, zumal sie recht heterogene Elemente enthält. Von Gattungswert wären folgende Merkmale:

1. Die Wangen sind entweder ganz verrundet oder treten mehr oder minder verbreitert und eckig vor.
2. Die Fühlerkeule ist 3-, 5-, oder 6-gliedrig.
3. Die Schienen sind oft scharf gekielt, oft stielrund.
4. Die Färbung. Eine Anzahl Arten ist metallisch oder blau gefärbt.

Die letzt erwähnte Gruppe macht durch eben dies Merkmal äusserlich einen ganz fremden Eindruck, da alle andern Boletophagiden schwarz oder braun gefärbt sind; ferner haben die metallischen Arten sämtlich eine 5-gliedrige Fühlerkeule, ungekielte Schienen, und so wäre eine Abtrennung gerechtfertigt, wenn nicht so gebildete Fühler und ungekielte Schienen auch bei andern Arten vorkämen und wenn nicht *Bradymerus pici* Chatin, eine blaue Art, scharf gewinkelte Wangen hätte. Vielleicht liesse sich die letztgenannte Art am besten noch abtrennen, denn ihre kegelförmig vortretenden Augen und die tiefen Stirnfalten finden sich bei keiner andern Art. Fünf-gliedrige Fühlerkeule haben wir bei einer Anzahl papuanischer Arten, ferner bei dem auch sonst abweichenden *B. incostatus* Gebien. Was nun die Kiele der Schienen anbetrifft, so finden sich neben solchen Arten, die scharf gekielte Tibien haben, auch andere, bei denen der Kiel undeutlich ist. Uebrigens sind gekielte Schienen meist bei den Arten vorhanden die eckig vortretende Wangen haben, aber auch in dieser Gruppe gibt es Ausnahmen, nämlich zwei Arten, die neben gekielten Schienen runde Wangen besitzen.

Ich halte es also für das Beste die Gattung bestehen zu lassen, wie sie jetzt ist.

Bestimmungstabelle für die indischen Arten der Gattung Bradymerus Perroud.[2]

1. Oberseite metallisch oder blau, nie einfach braun, Schienen ungekielt, Fühlerkeule 5-gliedrig .... 2.
Der ganze Körper einfarbig braun oder schwarzbraun, ohne Spur von Metallglanz, Fühlerkeule meist 6-gliedrig .... 9.
2. Die Augen treten konisch vor, Stirn mit tiefen Furchen, Zwischenräume ungekielt, Wangen stark abgesetzt, so breit wie die Augen. (Ostafrika.) .... **B. pici** Chatin.
Augen einfach gerundet, Stirnfurchen fehlen, Zwischenräume mindestens teilweise scharf gekielt, Wangen verrundet, meist schmäler als die Augen .... 3.
3. Halsschild mit mittlerer Längsfurche, Körper schwach metallisch, Decken oben ungekielt. (Andamanen.) .... **B. andamanus** Gebien.
Halsschild ohne Längsfurche, Körper stark metallisch oder blau, Decken fast immer scharf gekielt .... 4.
4. Halsschild fein und weitläufig punktiert, Vorderecken nicht vorragend .... 5.
Halsschild grob und dicht punktiert, die Vorderecken ragen vor .... 6.
5. Abdomen einfach punktiert, die Zwischenräume der Decken nur gewölbt, Fühler, Beine, und Unterseite schwarz. (Philippinen.) **B. caeruleipennis** Gebien.
Abdomen längsstrichig, Zwischenräume gekielt, Fühler, Beine, und Unterseite rot (ex Pascoe). (Ceylon.) .... **B. cyaneipennis** Pascoe.
6. Flügeldecken leuchtend blau, Prosternum hinten ganz niedergedrückt. (Philippinen.) .... **B. violaceus** Pascoe.

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[2] Tabellen für die zahlreichen papuanischen Arten und für die der Seychellen und umliegenden Inselgruppen erscheinen an anderer Stelle.

Flügeldecken grünlich oder bronzefarben, Prosternum hinten nur schwach gesenkt mit deutlicher Spitze .... 7.

7. Der sechste Zwischenraum der Decken ist scharf gekielt, Augenfurchen sehr tief, sich hinten vom Auge entfernend, die Punkte der Streifen mit einem mikroskopischen Körnchen am oberen Rande, die ersten Zwischenräume mit einer Reihe flachen weitläufigen Körnchen .... 8.

Der sechste und achte Zwischenraum flach gewölbt, Augenfurchen flacher, um das Auge herumgehend, Punkte der Streifen einfach, die ersten Zwischenräume ohne Körnerreihe. (Philippinen.)
B. carinatus Fairmaire.

8. Vorderkörper schwarzblau, Flügeldecken blaugrün. Halsschildseiten vor den Hinterecken nicht ausgeschweift, Hinterecken recktwinklig, der achte Zwischenraum nur vorn und hinten schwach gekielt, die ersten Zwischenräume fast unpunktiert. (Philippinen.)
B. eschscholtzi Gebien.

Vorderkörper blaugrün, Flügeldecken leuchtend bronzefarben, Halsschildseiten vor den Hinterecken deutlich ausgeschweift, diese daher spitz. Der achte Zwischenraum der ganzen Länge nach gekielt, die ersten sehr deutlich punktiert. (Ceylon.) .... **B. aeratus** sp. nov.

9. Halsschild vorn mehr oder minder kapuzenförmig über den Kopf gezogen, das dritte Fühlerglied kaum länger als das zweite; Keule 5-gliedrig, Vorderschienen mit Aussenendecke (ex Fairmaire. Diese Art gehört wahrscheinlich nicht in die Gattung *Bradymerus*). (Indien.) .... **B. cucullatus** Fairmaire.

Halsschild vorn nicht vorgezogen, das dritte Fühlerglied viel länger als des zweite, Vorderschienen ohne Aussenendecke .... 10.

10. Decken mit Grübchenreihen, Grübchen durch Querfältchen getrennt, alle Zwischenräume scharf gekielt (ex Fairmaire) (Java.)
B. grandis Fairmaire.

Decken mit feinen Reihen oder Streifen von Punkten, ohne Querfältchen, meist nur einzelne Zwischenräume gekielt .... 11.

11. Decken ganz ohne Kiele, wie *Gonocephalum* gestaltet, fein anliegend behaart. Hinterschienen des Männchens von hinten gesehen verdickt und innen mit kleinem Haarschopf, Vorderkopf auffällig lang, Wangen breit verrundet. (Sumatra, Simalur.) .... **B. incostatus** Gebien.

Decken mit scharfen Kielen oder Körnern, meist nackt, Männchen ohne Auszeichnung an den Hinterschienen .... 12.

12. Der neunte Zwischenraum läuft kielförmig in die Spitze, nur die abwechselnden sind scharf erhaben, Wangen stark winklig vortretend, Schienen mehr oder minder deutlich gekielt (hierher, von den papuanischen Arten, *regularis* Gebien) .... 13.

Der siebente oder achte Zwischenraum läuft kielförmig in die Spitze .. 15.

13. Schienen mit kaum einer Spur von Kielen, Beborstung der Decken kaum sichtbar, schwarz (*crenulicollis* Schaufuss nec Fairmaire.)
B. celebensis sp. nov.

Schienen deutlich gekielt, Beborstung der Decken deutlich, gelbgrau .. 14.

14. Länge, 5 bis 5.5 Millimeter, die Wangen vor den Augen stark S-förmig geschwungen, zuerst dem Vorderrand der Augen parallel (*denticeps* Gebien). (Sunda-Inseln.) .... **B. crenulicollis** Fairmaire.

Länge, 6 bis 7 Millimeter, die Wangen vor den Augen schwach S-förmig geschwungen, mit dem Vorderrand der Augen divergierend. (Ceylon.) .... **B. serricollis** Walker.[3]

15. Schienen vollständig und scharf gekielt .... 16.

Schienen ungekielt oder nur mit schwachen Kielen in der Basalhälfte .... 18.

16. Die Wangen treten eckig oder lappenförmig vor und sind viel breiter als die Augen .... 17.[4]

Die Wangen sind breit verrundet und nicht breiter als die Augen. Papuanische Art .... **B. principatus** Gebien.

17. Körper lang und schmal, Halsschild an den Seiten stark gezähnt, Flügeldecken mit groben Körnerreihen (*interruptus* Gebien). (Sumatra, Borneo.) .... **B. aratus** Fairmaire.

Körper sehr breit und flach, Halsschild an den Seiten ungezähnt, Flügeldecken mit feinen, glatten Kielen. (Philippinen.) **B. ferruginipes** Fairmaire.

18. Die Wangen treten winklig oder stark lappenförmig vor und sind viel breiter als die Augen .... 19.

Die Wangen sind ganz verrundet und so breit oder schmäler als die Augen .... 22.

19. Rand der Decken an den Schultern gesägt, Halsschild mit zwei knotigen Erhabenheiten, sehr gedrängt punktiert, ohne Körnchen. (Java, Sumatra.) .... **B. nodicollis** sp. nov.

Rand der Decken auch vorn glatt oder schwach gekerbt, Halsschild einfach gewölbt, mit deutlichen Graneln oder erhabenen kurzen Runzeln zwischen den Punkten .... 20.

20. Die Kiele aller Zwischenräume sind zum Teil in scharfe Körner aufgelöst, Halsschild grob und dicht runzlig gekörnt. **B. batjanensis** sp. nov.

Die Kiele glatt, Halsschild fein und eng punktiert und vereinzelt gekörnt .... 21.

21. Körper sehr breit und flach, Deckenrand vorn breit sichtbar und schwach krenuliert, vorn die ersten Zwischenräume ungekielt, die übrigen fast flach mit fein aufgesetzten Kielchen (*alternatus* Schaufuss). (Sumatra, Celebes, Sumbawa.) .... **B. interstitialis** Schaufuss.

Körper schmäler, normal, gewölbt, Deckenrand von oben kaum sichtbar, glatt, alle Zwischenräume vorn stark gekielt, dachförmig. (Java, Sumatra.) .... **B. spretus** sp. nov.[5]

22. Der siebente Zwischenraum ist kielförmig erhöht und läuft in die Spitze (bei *acutangulus* nur sehr kurz, bei *sijthoffi* verhältnismässig stumpf). Fühlerkeule 3- bis 5-gliedrig (Ausnahmen *pertyi* und *alternicostis* von den Philippinen, bei denen der Kopf längsgestrichelt ist) .... 23.

Der achte Zwischenraum läuft kielförmig in die Spitze, der siebente ist verkürzt, Fühlerkeule 6-gliedrig .... 27.

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[3] Neben diese Art ist *B. difficilis* zu stellen, der mir verspätet zuging.

[4] Hierher auch die papuanischen Arten *B. granaticollis* Fairmaire, *macrogonus* Gebien, *amicorum* Fairmaire, *lobicollis* Gebien, und zwei neue Arten von den Seychellen.

[5] Hierher sind die nachträglich eingegangenen Arten *B. propinquus* und *mindanaensis* zu stellen.

23. Alle Zwischenräume sind in scharfe, längliche Körner aufgelöst, die Vorderecken des Pronotums ragen sehr spitz und lang vor. (Java.) **B. acutangulus** sp. nov.

Die Zwischenräume glatt gekielt oder einfach gewölbt, nie scharf erhaben gekörnt, die Vorderecken des Pronotums ragen höchstens schwach vor und sind verrundet.......... 24.

24. Fühlerkeule 6-gliedrig, Pronotum ohne Mittelfurche, mindestens der fünfte und siebente Zwischenraum der ganzen Länge nach gekielt, Vorderecken des Pronotums viel weiter nach innen liegend als die hinteren. (Philippinen.) .... 25.

Keule 3- bis 4-gliedrig, Pronotum mit leichter Mittelfurche, seine Hinterecken so weit zusammengerückt wie die vorderen, höchstens der siebente Zwischenraum der ganzen Länge nach gekielt. (Java.).. 26.

25. Grund der dunkelbraunen Flügeldecken spiegelblank, Rippen der Scheibe fast glatt, die geraden Zwischenräume ohne Körner. **B. alternicostis** Gebien.

Grund der schwarzen Flügeldecken deutlich punktiert und sehr fein lederartig gerunzelt, die Rippen fein gekörnt, auch die geraden Zwischenräume hin und wieder mit Körnchen (*elongatus* Gebien nec Perty).......... **B. pertyi** Gebien.

26. Halsschild 1.5 mal so breit wie lang, der siebente Zwischenraum von der Schulter an gerippt, nur die höheren Rippen mit Spuren von sehr kleinen Körnchen, 3, 5, und 7 auch vorn erhabener. (Java.) **B. drescheri** sp. nov.

Halsschild 1⅓ mal so breit wie lang, der siebente Zwischenraum nicht gerippt, alle mit einer Reihe flacher, rundlicher, unauffälliger Körnchen.......... **B. sijthoffi** sp. nov.

27. Alle Zwischenräume (zuweilen bis auf die ersten beiden) mit scharfen, wenn auch oft feinen Kielen.......... 28.

Nur die abwechselnden Interstitien sehr hoch und scharf gekielt, die übrigen flach oder mit Spuren von einigen Körnchen. (Philippinen.). **B. mcgregori** Gebien.

28. Der Rand des Pronotums ist kräftig krenuliert, die geraden Zwischenräume sind vorn und hinten stark verkürzt (*javanus* Fairmaire). (Java.) .... **B. elongatus** Perty.

Der Rand des Pronotums ist glatt oder undeutlich gekerbt, die geraden Rippen fast vollständig und den andern gleich.......... 29.

29. Kopf und Halsschild an den Seiten fein längsrunzlig, letzterer stark depress, die Seiten sind scharf und breit verflacht abgesetzt. (Philippinen.).......... **B. impressicollis** Gebien.

Kopf und Halsschild zwischen den Punkten körnig erhaben, Pronotum auf der Scheibe mit leichtem Längseindruck, aber nicht verflacht, die Seiten sind schmal abgesetzt.......... 30.

30. Alle Zwischenräume, auch die ersten beiden, deutlich gekielt, Halsschild sehr grob punktiert und stark uneben, der vierte Streif mit circa 36 Punkten. (Philippinen.).......... **B. acuticostis** sp. nov.

Wenigstens der erste oder die beiden ersten Zwischenräume flach, der vierte Streif mit ungefähr 60 Punkten, Halsschild feiner punktiert und wenig uneben.......... 31.

31. Körper lang gestreckt und glänzend, Kopf und Halsschild zwischen der nicht gedrängten Punktierung mit feinen Körnern, der achte Zwischen-

raum nur vorn und hinten mit Spur von Kielen, der neunte flach. (Insel Christmas.) .... **B. seminitidus** Arrow.

Körper normal, matt, Kopf und Halsschild nur gedrängt punktiert, der achte Zwischenraum ganz und scharf gekielt, der neunte ebenfalls, aber schwächer. Die gemeinste und verbreitetste Art (*aequecostatus* Fairmaire). (Celebes bis Indien.) .... **B. clathratus** Schaufuss.

Bradymerus caeruleipennis Gebien.

Bradymerus caeruleipennis GEBIEN, Philip. Journ. Sci. § D **8** (1913) 380.

Von den Philippinen.

Bradymerus carinatus Fairmaire.
Bradymerus corinthius Fairmaire.
Bradymerus violaceus Pascoe.
Bradymerus eschscholtzi Gebien.

Die Auffassung dieser Arten ist keineswegs ganz entschieden. Sie sind sehr nahe miteinander verwandt. Leider liegen mir die alten Arten nicht in den Original-Exemplaren vor. Ich bin also bei ihrer Deutung allein auf die nicht ausreichenden Beschreibungen angewiesen. Fairmaire, der Autor der beiden erstgenannten Arten, zieht diese ohne Vorbehalt zusammen.[6] Ob aber ihre Identifizierung berechtigt ist scheint mir doch etwas zweifelhaft, denn von *B. corinthius* beschreibt er die Skulptur der Decken folgendermassen: "intervallis costatis, costis laxe asperulis, postice alternatim acute elevatis" und bei *carinatus* sagt er: "intervallis convexis, tectiformibus, alternatim magis acute costatis;" hier erwähnt er die Rauheiten nicht. Herr Blair sendet mir freundlichst ein Tier das er als *B. carinatus* bestimmt. Dieses hat scharfe kleine Körner auf allen Interstitien, besonders auf den flachen. Diese Skulptur ist so auffallend dass sie Fairmaire sicher ganz anders beschrieben haben würde. Ich kann also diese Form nicht für *carinatus*, auch nicht für *corinthius* halten, sondern muss sie als neu ansehen. Leider muss ich darauf verzichten diese Art zu beschreiben; denn die Bestimmungen des Britischen Museums verbieten ein Ausleihen der Typen, besonders der Einzelstücke. Und gerade bei den hier vorliegenden Arten ist eine ständige Konsultation der Originalstücke unerlässlich.

Es ist aber möglich dass *B. corinthius* (aber nicht *carinatus*) mit *eschscholtzi* zusammenfällt; doch passt die Beschreibung keineswegs genau. Das kann aber nur das Studium der Type entscheiden, die mir gegenwärtig leider nicht zugänglich ist.

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[6] Notes Leyd. Mus. 19 (1897) 218.

Die Sache wird nun dadurch viel verwickelter dass Herr Blair mir einige Tiere die ich als *B. carinatus* bestimmt haben würde (von Mount Banahao und Tayabas, die mit Stücken meiner Sammlung von denselben Fundorten genau übereinstimmen) als *B. violaceus* Pascoe determinierte. Entgegen seiner sonstigen Gepflogenheit hat er diese Tiere nicht mit der Bezeichnung "cotype" oder "comp. with type" versehen. Da ich aber annehme dass ihm das Originalstück von Pascoe vorgelegen hat, habe ich keinen Anlass die Richtigkeit dieser Bestimmung zu bezweifeln, trotzdem die Farbe der Tiere ganz anders ist als Pascoe angiebt. Nur ein Tier meiner eigenen Sammlung stimmt genau mit Pascoe's Beschreibung überein.

Was nun wirklich *carinatus, corinthius,* und *violaceus* ist, wage ich nicht zu entscheiden. Ich möchte aber annehmen dass alle drei eine einzige, ungemein variable Art bilden. Dagegen glaube ich dass *B. eschscholtzi* und das eine, oben erwähnte Stück des Britischen Museums, das Herr Blair als *carinatus* bestimmte, davon gut geschiedene Arten sind. Ich bedaure das mir gegenwärtig von allen hier genannten Formen nur elf Stück vorliegen, die inbezug auf Farbe und Skulptur sowohl des Vorder- als auch des Hinterkörpers sehr verscheiden sind.

Die Farbe.—Fünf Exemplare haben goldig-kupfrig-metallische Flügeldecken und meist einen mehr grünlichen, zuweilen aber auch ebenso gefärbten Vorderkörper; ein Exemplar (Type von *eschscholtzi*), einen schwärzlichgrünen Hinter- und blauschwarzen Vorderkörper; ein siebentes Tier (das oben erwähnte, von Blair als *carinatus* bestimmte, mit gekörnten Interstitien versehene Stück) hat grün-bronzefarbene Flügeldecken und bläulichen Vorderkörper; ein Tier ist ganz violett; ein anderes blau; zwei Tiere haben purpur-violette Flügeldecken, davon das eine einen ebenso gefärbten Vorderkörper, das andere einen bläulich-violetten.

Skulptur.—Bei fast allen Stücken ist der Kopf gedrängt aber einfach punktiert, dagegen deutlich längsrunzlig nur bei *eschscholtzi* und nach der Beschreibung bei *corinthius.* Der Thorax ist entweder einfach und ziemlich grob punktiert, oder die Punkte haben körnige, unregelmässige Erhabenheiten. Die Rippen und Zwischenräume sind meist glatt, bei *eschscholtzi* dagegen und dem genannten Tier des Britischen Museums, *"carinatus"* Blair, sind sie gekörnt, bei dem ersteren nur hinten und schwach, bei dem letzteren scharf und auch vorn. Die Rippenbildung selbst ist sehr veränderlich, so sehr dass fast kein Tier dem andern gleicht; immer aber sind die abwechselnden Zwischenräume hinten schärfer erhaben. Sehr veränderlich ist auch die Form und Furchung des Prosternums; auch die Punktierung der Beine, die gröber und dichter bei *eschscholtzi,* feiner und weitläufiger bei den andern Tieren ist, weist erhebliche Schwankungen auf.

Gestalt.—Recht veränderlich ist sowohl die Gesamtform des Körpers, als auch die Gestalt des Pronotums. Ein sehr gedrungenes Stück hat purpur-violette Flügeldecken, während unter den anders gefärbten Tieren sehr schlanke Tiere vorkommen. Die Seiten des Pronotums sind mehr oder minder stark gebogen, bei *eschscholtzi* dagegen fast geradlinig, bei den ersteren vor den Hinterecken meist deutlich ausgeschweift. Oft liegen Vorder- und Hinterecken fast gleichweit auseinander, meist dagegen die vorderen viel enger zusammen. Auch die Randung ist verschieden; bei *eschscholtzi* und *"carinatus"* Blair sehr fein, bei allen andern dagegen viel dicker. Die Randkante selbst ist zuweilen deutlich, wenn auch schwach krenuliert, meist dagegen glatt.

Wir sehen also, dass es ungemein schwierig ist die Arten scharf zu trennen. Ich habe aber versucht, trotz der Unzulänglichkeit meines Materials und trotzdem mir die Typen nicht vorlagen, die einzelnen Formen in der Tabelle auseinander zu halten. Doch ist das letzte Wort über die genannten Arten noch nicht gesprochen.

Das vorläufige Resultat meiner Untersuchungen ist also das folgende:

1. Trotz der oben angegebenen Bedenken halte ich einstweilen die von Fairmaire gegebene Synonymie seiner beiden Arten fest, betrachte also *B. corinthius* und *B. carinatus* für identisch.
2. Im Gegensatz zu Herrn Blair deute ich *B. violaceus* Pascoe auf eine rein violette Form und fasse die andern von ihm als *violaceus* bezeichneten hell metallischen Stücke als *carinatus* auf, das ist die häufigste Form mit kupfrig-goldig metallischen Flügeldecken.
3. *Bradymerus eschscholtzi* Gebien halte ich für eine gute Art mit rauhen Interstitien, geraden Halsschildseiten, fein längsstrigosem Kopf, grob punktierten Schenkeln, äusserst feinem Halsschildrande, und so weiter.

Bradymerus aeratus sp. nov.

Breit, flach, nackt, Vorderkörper matt bläulich grün, Flügeldecken glänzend bronzefarben, nach den Seiten hin etwas kupfrig.

Der Kopf ist flach, Augenfalten fehlen, die Augenfurchen sind sehr tief und scharf, liegen vorn dem Auge an und gehen hinten zur Seite in den Nacken, die Schläfen abschnürend. Die Augen treten nicht vor, die Wangen haben fast Augenbreite, sind aber breit verrundet, der Vorderkopf ist nicht eingezogen, die Ecken sind abgerundet, das Epistom ist fast gerade abgestutzt. Die Oberlippe ist scharf quer gekielt, die Punktierung ist dicht und ziemlich grob, die Zwischenräume der Punkte bilden besonders hinten kurze Längsrünzelchen. Die Fühler sind kurz und dick, Glied 3 ist nur 1.5 mal so lang wie dick, etwas länger als 4, die Keule ist gut abgesetzt, 5-gliedrig, ihr erstes Glied ist so breit wie lang, das vorletzte 2.5 mal so breit wie lang. Das Kinn ist nach vorn erhöht und hat einen schmalen, scharfen Längskiel, die Mandibeln sind am Ende fast gerade abgestutzt.

Der Halsschild ist nicht ganz doppelt so breit wie lang, querüber kräftig gewölbt, doch ist der Seitenrand schmal verflacht, die Randkante ist nur ganz leicht uneben. Die Vorderecken ragen lang und spitz vor, die Hinterecken sind scharf rechtwinklig und liegen etwas weiter nach aussen als die vorderen, die Seiten sind vor ihnen ganz leicht ausgeschweift. Der basale Mittellappen ist verflacht und leicht abgeschnürt, aber nicht durch eine deutliche Furche, die Vorderecken sind nach unten gerichtet. Die Punktierung ist grob und sehr dicht, die Zwischenräume der Punkte sind stellenweise, besonders nach den Seiten hin, etwas erhaben, aber nicht gekörnt, nur hin und wieder etwas längsrunzlig.

Die Flügeldecken haben eine flache Scheibe, die Seiten fallen senkrecht ab, die Randkante ist von oben leicht überdeckt. Es sind kräftige Punktstreifen vorhanden, aber die inneren sind viel feiner als die äusseren, die Punkte sind eingedrückt. Die ersten Zwischenräume sind ganz flach, nur an der Spitze leicht gewölbt, der dritte ist im letzten Drittel scharf gekielt, der fünfte von der Schulter an, der sechste ist hinten verkürzt, 7 und 8 sind wieder ganz gekielt. Die Interstitien sind punktiert und die ersten (2, 3, und 4) mit einzelnen, ganz flachen, unauffälligen Körnchen versehen. Die Kiele sind scharf aufgesetzt, nicht unterbrochen, durch eine mikroskopische Punktreihe unmittelbar unter der Schneide abgesetzt. Auch die Punkte der Streifen sind bei starker Vergrösserung charackteristisch, die inneren haben innen und aussen an ihrem Absturz je ein winziges Körnchen, die groben der äusseren Streifen nur aussen.

Das Prosternum ist hinten niedergebogen, dort leicht gefurcht, aber mit aufgesetzter Spitze, die Mittelbrust ist V-förmig ausgeschnitten mit kurz verrundeten Ecken. Die Propleuren sind sehr grob punktiert, das Abdomen ist nicht eingedrückt, deutlich aber nicht dicht punktiert. Die Beine sind kurz und dick, die Schienen sind rund, ungekielt.

Länge, 9.7 Millimeter; Breite, 4.

Ein Exemplar von Ceylon in meiner Sammlung.

Diese Art gehört mit *corinthius, violaceus,* und so weiter in eine Gruppe, ausgezeichnet durch die sonst bei Boletophagiden nicht vorkommende, metallische, respektiv blaue Färbung. Ihr nächster Verwandter ist *corinthius* (*carinatus*) von den Philippinen. Unsere Art ist aber breiter, hat andere Skulptur der Flügeldecken (der sechste und achte Zwischenraum sind gekielt), verrundete statt scharfer Ecken des Mesosternums, etc.

Bradymerus cyaneipennis Pascoe.

Bradymerus cyaneipennis PASCOE, Ann. & Mag. Nat. Hist. V 11 (1883) 438.

Diese Art ist mir leider unbekannt geblieben. Ich muss mich also auf eine Wiedergabe der Beschreibung beschränken:

B. oblongus, cyaneus, capite prothoraceque cyaneo-nigris, subtiliter punctatis, antennis pedibus et corpore infra rufocastaneis. Long 6 lines.

Oblong, head and prothorax bluish black; elytra indigo blue; antennae, legs and body beneath reddish-chestnut; head and prothorax minutely punctate, the latter with its anterior angles not produced; scutellum triangular, brownish; elytra parallel at the sides, strongly striate-punctate, the interstices raised and smooth; body beneath and legs finely punctate, the abdominal segments longitudinally striolate.

Die bedeutende Grösse, die Färbung der Unterseite und der Beine, und die gekielten Zwischenräume sind Merkmale welche diese Art hinlänglich von *B. caeruleipennis* Gebien von den Philippinen unterscheidet.

Von Ceylon.

Bradymerus andamanus Gebien.

Bradymerus andamanus GEBIEN, Notes Leyd. Mus. 32 (1914) 63, nota.

Die metallische Färbung dieser Art ist keineswegs so auffällig wie bei den vorhergehenden. Von diesen unterscheidet sie sich leicht durch den sehr schmalen Körper, die leichte Furche auf dem Halsschild, und die ungekielten Decken. Mir liegen jetzt aus dem Berliner Museum drei weitere Stücke vor.

Nur von den Andamanen.

Bradymerus incostatus Gebien.

Bradymerus incostatus GEBIEN, Notes Leyd. Mus. 32 (1914) 62.

Diese Art, zu deren Beschreibung nichts wesentliches hinzu gefügt zu werden braucht, liegt mir jetzt von mehreren Fundorten vor. Die in der Beschreibung angegebene Bildung der Hinterschienen ist, wie ich an dem grösseren mir vorliegenden Material sehe, ein Merkmal der Männchen. Keine andere Art der Gattung zeigt ein gleiches, nur die Gattung *Sumbawia.*

Simalur, Sinabang, Mai, 1913 (*Jacobson*). Nias (*A. L. v. Hasselt*). Sumatra, Palembang (*Knappert*); Manna (*Knappert*). Java, Tjilatjap, Oktober, 1910 (*Drescher*).

In den Sammlungen Leyden, Veth, Drescher, und Gebien.

Bradymerus celebensis sp. nov.

Bradymerus crenulicollis SCHAUFUSS, Horae Soc. Ent. Ross. 21 (1887) 134, nec Fairmaire.

Von normaler Gestalt, glänzend schwarzbraun.

Der Kopf ist stark quer, die Augenfalten und Augenfurchen sind deutlich, aber nicht auffällig, die ersteren niedrig, die letzteren kurz. Die Wangen sind stark verbreitert und treten gerundet winklig vor die Augen, ihr Vorderrand ist leicht S-förmig geschwungen, läuft aber zuerst nicht mit dem Vorderrand der Augen parallel, vom Epistom sind die Wangen durch einen deutlichen Einschnitt abgesetzt, in welchen die halbkreisförmige Quernaht einmündet, die Seiten des Epistoms sind auf kurze Strecke parallel, der Vorderrand ist gerade abgestutzt. Die Punktierung ist grob und dicht, die Zwischenräume der Punkte bilden hinten hohe, scharfe, meist längliche Erhabenheiten, vorn mehr runde Körnchen. Die Fühler haben eine gut abgesetzte Keule von sechs queren Gliedern.

Das Pronotum ist in der Mittellinie kaum halb so lang wie breit, der Vorderrand ist in der Mitte leicht vorgezogen, die Vorderecken ragen lang und spitz vor, sind aber am äussersten Ende kurz verrundet. Die Hinterecken sind stumpfwinklig, die Seiten sind gleichmässig stark gerundet, hinter der Mitte am breitesten, nach vorn stärker verengt, daher liegen die Vorderecken wesentlich weiter nach innen als die hinteren. Die Verflachung der Seiten ist nicht scharf abgesetzt, die Seitenrandkante ist grob krenuliert, fast gezähnt. Der basale Mittellappen ist verflacht abgesetzt und blank. Die Punktierung ist grob, aber viel feiner als bei *crenulicollis,* die Punkte sind von einander getrennt, jeder hat am Grunde ein zentrales, feines Körnchen, aber auch unter starker Vergrösserung keine Beborstung, die Zwischenräume der Punkte sind scharf und nicht dicht granuliert.

Die Flügeldecken sind äusserst kurz, nur bei Ansicht von hinten nach vorn sichtbar, schwarz, aufstehend, fein beborstet, sie sind parallelseitig, ihre Seitenrandkante ist vorn von oben gerade noch sichtbar. Es sind Reihen feiner, tief eingestochener Punkte vorhanden. Nur die abwechselnden Zwischenräume sind gekielt und zwar der erste nur hinter der Mitte bis zur Spitze, er hat am Schildchen nur einige Körnchen, 3, 5, 7, und 9 sind vollständig, hoch und scharf gekielt, 9 läuft kielförmig in die Spitze, 2, 4, 6, und 8 sind ganz flach, blank und ungekörnt. Die Schienen sind ungekielt, nur die Basis zeigt die Spur einer Längserhabenheit.

Länge, 7 bis 7.8 Millimeter; Breite, 3.4 bis 3.6.

Zwei Exemplare von Celebes ex coll. Schaufuss im Museum Berlin, von denen mir eines für meine Sammlung überlassen wurde.

Dieses ist die Art welche Schaufuss für *crenulicollis* Fairmaire hält, mit dem sie in der Tat grosse Aehnlichkeit hat, sie ist aber wesentlich grösser, die Beborstung der Decken ist sehr kurz, schwarz statt gelblich. Die Punkte des Pronotums sind viel feiner, die Wangen zwar auch S-förmig geschwungen, aber sie laufen zuerst nicht mit dem Vorderrand der Augen parallel, der Hauptunterschied liegt aber in den fast ungekielten Schienen. Näher noch steht *B. serricollis* Walker von Ceylon, der gleiche Grösse hat, aber unsere Art ist leicht an der schwarzen kaum sichtbaren Behaarung der Decken, den ungekielten Schienen, den stark erhabenen, durchaus glatten Hauptkielen der Flügeldecken zu erkennen.

Die Arten *serricollis, crenulicollis, celebensis,* und ein paar papuanische, die aber ganz andere Deckenskulptur haben, bilden eine besondere Gruppe, bei welcher der neunte Zwischenraum kielförmig in die Spitze läuft. Die Wangen treten stark winklig vor.

Bradymerus crenulicollis Fairmaire.

Bradymerus crenulicollis FAIRMAIRE, Notes Leyd. Mus. 4 (1882) 221.
Bradymerus denticeps GEBIEN, Saraw. Mus. Journ. 2 (1914) 11.

Fairmaire's Beschreibung übergeht sehr wichtige Merkmale, zum Beispiel, die eckig, fast spitz vortretenden Wangen, die gekielten Schienen, die reihige, kurze Behaarung der Decken, so dass ich die Art verkannte und unter dem Namen *denticeps* noch einmal beschrieb. Man wird also die Art unter Fairmaire's

Namen zitieren und die Beschreibung bei *denticeps* nachzulesen haben. Mir liegen 48 Exemplare vor aus den Sammlungen Berlin, Dahlem, Hamburg, Leyden, Sarawak, Veth, und Gebien.

Sumatra, Si-Rambi, Dezember, 1890; März, 1891 (*E. Modigliani*); Medan; Manna (*Knappert*); Residentschaft, Palembang (*Knappert*); Rawas, Mai, 1878 (Cotype!). Engano, Kisa-juc, Mai, 1891 (*Modigliani*); Bua-Bua, Mai bis Juni, 1891 (*Modigliani*). Java, Semarang, Mai, 1906; Juni, 1907 (*Drescher*); Buitenzorg, 24ten Februar bis 12ten März, 1904 (*K. Kraepelin*); Batavia, August, 1908 (*E. Jacobson*); Pengalengan, 4,000 Fuss (*Fruhstorfer*); Depok (*Nierstrass*); Poentjak, Megamendoeng (*J. D. Pasteur*). Borneo, Kinabalu (*Waterstradt*); Moeara teweh (*Semmelink*); Boven Mahakkam (*Dr. Nieuwenhuis*). Celebes, Macassar (*Piepers*); Minahassa (*Dr. O. Warburg*). Philippinen, Mindanao, Iligan (*Baker*).

Bradymerus serricollis (Walker).

Opatrium serricolle WALKER, Ann. & Mag. Nat. Hist. II 3 (1858) 284; WATERHOUSE, Ent. Mo. Mag. 14 (1875) 56.

Die Beschreibung lautet.

> Pices nigrum, thorace scabro, lateribus denticulatis, elytris subpunctatis, costis quatuor bene determinatis. L. 2½ lin.

Man wird zugeben, dass die Beschreibung selbst bescheidenen Ansprüchen nicht genügen kann. Nur dadurch, das Waterhouse die Zugehörigkeit zu unserer Gattung feststellt, ist eine Deutung möglich. Eine Neubeschreibung dürfte wichtig sein.

Von normaler Gestalt, schwarzbraun, matt, nach Reinigung blank, Flügeldecken mit gelblicher, sehr kurzer, aufrechter Beborstung in Reihen.

Der Kopf hat sehr kurze, tuberkelähnliche Augenfalten, die Wangen sind viel breiter als die Augen, sie treten kurz gerundet winklig vor, ihr Rand ist leicht S-förmig geschwungen, divergiert aber stark mit dem Vorderrand der Augen, die Clypealsutur ist halbkreisförmig, gut eingedrückt, ihre Ausmündungsstelle bildet einen kräftigen Ausschnitt zwischen Wange und Epistom, das zuerst parallelseitig ist. Die Skulptur besteht aus sehr groben Punkten, die im flachen Grunde ein zentrales Körnchen tragen, die Zwischenräume bilden ein ziemlich regelmässiges Netzwerk, das hin und wider erhaben, körnchenartig ist. Die kurzen Fühler bilden eine 6-gliedrige, gut abgesetzte Keule, deren Glieder kräftig quer sind, nur das letzte ist länger als breit, das Kinn ist quer, beborstet, stumpf gekielt.

Der Halsschild ist über doppelt so breit wie lang, die Mitte ist leicht vertieft, die Seiten sind stark gerundet, hinter der Mitte am breitesten, der Rand ist breit verflacht abgesetzt, die Randkante hat ungefähr zehn Sägezähne, die Basis ist leicht aufgebogen besonders in der Mitte, die Hinterecken sind stumpfwinklig, die Vorderecken ragen lang und spitz vor. Die Skulptur ist wie die des Kopfes; auch hier tragen die in den Punkten stehenden Körnchen je ein winziges Börstchen. Die Körner auf den Zwischenräumen sind aber wesentlich stärker.

Die Flügeldecken sind parallel, ihre Randkante ist von oben gerade noch sichtbar. Die Streifen 1, 3, 5, 7, und 9 sind hoch und schmal gekielt, der Kiel des ersten Streifens ist in der Mitte in Körnchen aufgelöst, 3, 5, und 7 sind vollständig, 9 ist vorn verkürzt und in Körnchen aufgelöst, läuft aber hinten scharf erhaben zur Spitze durch. Die Kiele sind nicht glatt, sondern haben eine stark krenulierte Schneide, unter welcher sich winzige, kurze Börstchen tragende Pünktchen befinden, jeder gerade Zwischenraum (2, 4, 6, und 8) trägt ebenfalls eine Borstenreihe, die Punkte der Streifen sind ziemlich grob. Unter starker Vergrösserung erweisen sich die Börstchen als deutlich gekeult.

Das Prosternum ist hinten niedergebogen, fein doppelfurchig, die Propleuren sind einfach, ziemlich grob punktiert, die Punktierung des Abdomens ist fein, nicht sehr eng. Die kurzen Schienen sind aussen scharf gekielt.

Länge, 6 bis 7 Millimeter; Breite, 2.7 bis 3.

Ceylon (*Nietner*), Weligama (*W. Horn*) 1899; Negombo (*Horn*).

In den Sammlungen Berlin, Dahlem, und Gebien.

Diese Art ist mit *B. crenulicollis* Fairmaire sehr nahe verwandt, aber etwas grösser, robuster; ein sicherer Unterschied liegt in der Bildung der Wangen, die bei unserer Art schwach S-förmig geschwungen sind und mit dem Vorderrand der Augen stark divergieren, bei Fairmaire's Art dagegen stark geschwungen und daher zuerst mit dem Augenrand parallel.

Bradymerus difficilis sp. nov.

Diese Art ist dem *B. serricollis* so täuschend ähnlich dass es genügt die Unterschiede hervorzuheben. Im übrigen wird auf die Beschreibung der vorigen Art verwiesen. Die vorletzten Fühlerglieder sind doppelt so breit wie lang, bei *serricollis* nur reichlich 1.5 mal, das Pronotum ist noch gröber punktiert, die Rippen der Decken sind fast glatt, bei der Art von Ceylon der ganzen Länge nach deutlich krenuliert. Der neunte Zwischenraum ist bis zur Schulter scharf gekielt, bei der andern Art dagegen dort in Körner aufgelöst; ferner fehlt eine abstehende Behaarung auf den Decken, doch ist das vielleicht individuell.

Länge, 6.7 Millimeter.

Mindanao, Kolambugan (*Baker*), ein Exemplar.

Bradymerus propinquus sp. nov.

Ziemlich breit, Oberseite schwarzbraun, Vorderkörper matt. Flügeldecken schwach glänzend, Unterseite dunkelbraun, Beine rotbraun.

Kopf breit und flach, ausserordentlich fein und gedrängt, undeutlich punktiert und sehr schwach körnig, die Quernaht deutlich, aber nicht eingeschnitten. Die Wangen sind viel breiter als die Augen, aber verrundet; der Vorderkopf ist eingezogen verengt. Die Fühler haben eine 6-gliedrige Keule, deren vorletzten Glieder 1.5 mal so breit wie lang sind, das letzte Glied ist fast kugelig. Die Augenfalten sind kräftig erhaben, aber kurz, die Wangen sind unmittelbar vor den Augen flach vertieft.

Der Halsschild ist flach, nicht gekörnt, sehr dicht punktiert, ohne Mittelfurche, aber in der Mitte flachgedrückt. An den Seiten, eben hinter der Mitte, befindet sich ein schwacher, rundlicher Eindruck. Die Randkante ist schwach uneben. Die grösste Breite liegt eben hinter der Mitte, dort ist das Pronotum über doppelt so breit wie in der Mittellinie lang. Die Hinterecken sind scharf stumpf, die vorderen ragen lang und ziemlich spitz vor.

Die Flügeldecken sind breit, der Seitenrand ist von oben gerade noch sichtbar. Alle Zwischenräume sind mit einem scharfen aber niedrigen Kiel versehen, der erste wenigstens von der Mitte an. An der Basis sind die ungeraden bis vorn verlängert, die andern etwas kürzer; die ersteren sind an der Spitze allein erhaben, die andern erloschen, aber nicht gekörnt. Die Kiele sind glatt, der achte läuft scharf in die Spitze, der neunte ist auch vorn bis zur Schulter erhaben, dort allerdings schwächer und in Körner aufgelöst.

Die blanke Unterseite ist in der Mitte des Abdomens so fein anliegend goldgelb behaart dass die Pubescenz nur von der Seite zu sehen ist. Das Prosternum ist schwach gefurcht, das Mesosternum halbkreisförmig ausgeschnitten. Die Punktierung des Abdomens ist ausserordentlich fein und dicht. Die Beine sind kurz, die Schienen gerade, ungekielt.

Länge, 6.9 Millimeter.

Mindanao, Tangkulan, Bukidnon (*Baker*), ein Exemplar.

Diese Art ist dem *B. ferruginipes* (in der Auffassung wie ich sie in der Tabelle gegeben) sehr ähnlich. Es ist nicht ausgeschlossen dass dieses die Art ist die Fairmaire bei der Beschreibung vorgelegen hat. Mangels genauer Angaben über Schienen, Kopfbildung, und genauer Verlauf der Kiele auf den Decken, bleibt die Frage, welches die echte *ferruginipes* ist, unentschieden. Unsere Art unterscheidet sich scharf von der die ich als Fairmaire's Art ansehe, durch ungekielte Schienen und die Skulptur der Decken, auf der alle Interstitien gekielt sind. Am nächsten steht aber *B. spretus* von Java; diese ist aber kleiner, blank, oben braun, und der Halsschild hat an den Seiten keine flache Grübchen und ist gröber punktiert. Auch die Punkte der Decken sind gröber, und der neunte Kiel ist nur hinter der Mitte entwickelt; auch findet sich bei *spretus* wenigstens die Spur von Kielen auf den Schienen.

Bradymerus mindanaensis sp. nov.

Klein, ziemlich schmal, querüber stark gewölbt, schwarzbraun, Flügeldecken glänzend, Fühler und Beine rotbraun.

Der Kopf ist lang, flach, vorn äusserst fein punktiert, hinten sehr dicht und gröber; die Zwischenräume der Punkte sind sehr schwach und länglich körnig. Die Wangen sind viel breiter als die Augen und treten gerundet winklig vor, sie sind so lang wie die Augen hinter ihnen, ihr Rand läuft aber nicht mit dem des Auges parallel. Der Vorderkopf ist geradlinig verengt und hat eine winzige Incision beim Ausgang der Quernaht. Augenfalten sind sehr undeutlich, die Augenfurchen tief und schmal. Die Fühlerkeule ist 6-gliedrig, die vorletzten Glieder sind 3 mal so breit wie lang.

Das Pronotum ist doppelt so breit wie lang, die Scheibe ist stark gewölbt, der Seitenrand ist ziemlich breit und gleichmässig, scharf verflacht, die Randkante ist gezähnt, aber die Zähne sind nicht scharf, die Mitte ist leicht flach gedrückt, ohne Mittelfurche, die Vorderecken ragen lang und ziemlich spitz vor, sie stehen so weit auseinander wie die Hinterecken, die stumpf sind. Die Seiten sind stark gerundet; die Oberfläche ist grob punktiert, die Zwischenräume der Punkte sind nicht deutlich gekörnt, eine Behaarung fehlt.

Die Flügeldecken sind querüber zylindrisch gewölbt, der Seitenrand ist nur dicht an der Schulter von oben zu sehen, er ist glatt. Die Zwischenräume sind gekörnt, 1, 3, 5, 7, und 8 sind gekielt, 1 nur im letzten Drittel. Die Kiele sind krenuliert, nur hinten fast glatt und dort scharf erhaben, 8 läuft von der Schulter an durch bis zur Spitze, 9 hat nur ganz vorn und hinten einige Körner. Eine Behaarung fehlt.

Die Unterseite ist blank, unbehaart, das Abdomen kräftig punktiert, die Schienen sind ungekielt.

Länge, 5.2 Millimeter.

Mindanao, Kolambugan (*Baker*), ein Exampler, in meiner Sammlung.

Die Art ist auf den ersten Blick dem *B. crenulicollis* sehr ähnlich, hat ebenfalls vortretende Wangen und gezähnte Halsschildseiten; ist aber sehr weit geschieden durch ungekielte Schienen und die Skulptur der Decken: es geht der achte und nicht der neunte Kiel in die Spitze, auch ist das Pronotum nicht scharf gekörnt und die Decken sind unbehaart. Sie ist neben *B. spretus* und *interstitialis* zu stellen, von beiden aber weit geschieden durch nur alternierend erhabene Rippen und die Halsschildform, das Pronotum ist zur Basis und Spitze gleich stark verschmälert. Beide Arten sind überdies viel breiter und haben lange, nicht so stark quere Glieder der Fühlerkeule.

Bradymerus aratus Fairmaire. Tafel 1, Fig. 1.

Bradymerus aratus FAIRMAIRE, Notes Leyd. Mus. 18 (1896) 100.
Bradymerus interruptus GEBIEN, Saraw. Mus. Journ. 2 (1914) 12.

Von dieser Art, deren Originalbeschreibung durch die des Synonyms ergänzt wird, liegen mir nur zwei Exemplare vor, eines aus der Sammlung Veth, eines aus meiner eigenen.

Sumatra, Palembang (*Knappert*). Borneo, Njabang (der Typus von *B. interruptus* Gebien).

Bradymerus nodicollis sp. nov.

Von der Gestalt des *B. clathratus* (*aequecostatus*), schwarzbraun, Vorderkörper matt, Hinterkörper glänzend, Unterseite hellbraun, die ersten Fühlerglieder und die ganzen Beine gelbbraun.

Der Kopf hat stark winklig vortretende Wangen, die viel breiter sind als die Augen, und die vor den Augen grubig eingedrückt sind, die Seiten des Vorderkopfes sind eingezogen verengt und haben am Beginn des Epistoms einen winzigen Einschnitt, die Clypealnaht ist deutlich eingeschnitten, Augenfalten sind undeutlich. Augenfurchen schmal, aber scharf. Die Oberfläche ist dicht gedrängt punktiert, etwas uneben, aber in den Zwischenräumen der Punkte nicht gekörnt. Die Fühler haben eine stark abgesetzte Keule von sechs queren Gliedern, nur das elfte ist etwas länger als breit, 3 viel länger als 4, zylindrisch, über doppelt so lang wie dick.

Der Halsschild ist 2.5 mal so breit wie in der Mittellinie lang, die Seiten sind stark gerundet, hinter der Mitte am breitesten, sie sind leicht krenuliert, nicht gezähnt. Der Vorderrand ist gerade, die Vorderecken ragen weit vor, sind aber am Ende abgerundet. Die Basis ist durch eine starke Randlinie dick abgesetzt, in der Mitte am breitesten, die Hinterecken sind scharf stumpfwinklig, der Seitenrand ist breit verflacht, durch undeutliche Querfalten uneben, und sehr fein und unregelmässig längsstrichig. Auf der Scheibe findet sich jederseits der Mitte, einander genähert, eine rundliche, kräftig erhabene Beule. Die Punktierung ist dicht gedrängt, nur im basalen Lappen sparsamer und feiner.

Die Flügeldecken haben scharfeckige Schultern, der Seitenrand ist von oben vorn breit sichtbar, unmittelbar hinter der Schulter stark krenuliert, hinten glatt und leicht überdeckt. Es sind Reihen ausserordentlich feiner, gleichmässiger, scharf eingestochener Punkte vorhanden. Alle Zwischenräume sind sehr fein, flach und schmal, scharf gekielt, der erste allerdings nur hinten und an der Basis deutlich, 1, 3, 5, und 7 sind an der Basis höher und laufen bis zur Spitze, 2, 4, und 6 sind vorn und hinten verkürzt. In der Mitte sind alle Zwischenräume gleichhoch, der achte läuft kielförmig bis in die Spitze. Körnelung der Zwischenräume fehlt ganz.

Das Prosternum ist hinten ganz niedergedrückt und am Ende mit aufgebogener Spitze versehen, das Mesosternum ist vorn tief eingedrückt, die Ecken sind ganz verrundet. Das Abdomen hat keinen Eindruck und ist mikroskopisch fein und weitläufig behaart. Die Beine sind schlank, die Schienen sehr dünn, stielrund, ohne Spur von Kielen.

Länge, 5.7 bis 8 Millimeter; Breite, 3 bis 4.

Java (ohne genauere Angabe); Montes Tengger, 4,000 Fuss (*Fruhstorfer*); Lawang (*Buysman*). Sumatra, Vulkan von Agam, April, 1911 (*Drescher*).

In den Sammlungen Leyden, Drescher, und Gebien (Type!).

Diese Art erinnert wegen der Deckenskulptur an den gemeinen *clathratus* (*aequecostatus*), sie unterscheidet sich aber leicht durch die glänzenden Flügeldecken, stark vortretende Wangen, die vorn etwas S-förmig geschwungen sind, durch breit verflachte Seiten des Pronotums, die deutlich quer gefältelt sind, die beiden Höcker auf dem Pronotum, den vorn gekerbten Rand der Decken.

Die beiden letzten Merkmale finden sich überhaupt bei keiner andern mir bekannten Art der Gattung.

Bradymerus batjanensis sp. nov.

Schwarzbraun, glänzend, von der normalen Gestalt des *clathratus* (*aequecostatus*).

Der Kopf ist stark quer, die Augen sind sehr schmal, stark schräg nach vorn gerichtet, mit tiefen, aber kurzen Augenfurchen und scharfen Augenfalten versehen. Die Wangen sind viel breiter als die Augen und liegen gerundet lappenförmig vor ihnen, sie sind nicht eingezogen verengt, das Epistom ist lang, scharfwinklig von den Wangen abgesetzt, parallelseitig, vorn gerade abgestutzt. Die Oberlippe ist scharf gekielt, die halbkreisförmige Clypealnaht ist kräftig eingedrückt. Die Punktierung ist auf der Stirn und hinten grob und dicht, die Zwischenräume bilden hoch erhabene, scharfe, meist längliche, verworrene Runzeln; vorn ist die Punktierung wesentlich feiner. Die Fühler sind hellbraun oder gelblich, sie haben eine 6-gliedrige Keule, deren Glieder doppelt so breit wie lang sind und starke Sinnesporen haben. Glied 3 ist fast zylindrisch, sehr schwach konisch, doppelt so lang wie 4, dieses und 5 sind so breit wie lang. Das Kinn hat einen nur vorn scharfen Kiel.

Das Pronotum ist über doppelt so breit wie lang, hinter der Mitte am breitesten, nach hinten schwach, nach vorn stärker verengt, die Hinterecken sind scharf rechtwinklig, die vorderen lang und spitz vorragend, circa 70° gross, bis zum Vorderrand der Augen reichend. Die Mitte des Vorderrandes ist leicht vorgezogen, die Basis kräftig, in der Mitte dicker gerandet, dort findet sich ein sehr kleiner Spiegelfleck. Die Seiten sind breit verflacht, die Randkante ist kräftig krenuliert, die Mittellinie ist leicht furchig vertieft. Die Skulptur ist ähnlich wie bei *seriatus*, sie besteht aus sehr groben Punkten mit flachem Grunde, die Zwischenräume sind sehr hoch und scharf körnig erhaben. Unter sehr starker Vergrösserung zeigen die Punkte meist (besonders die kleineren des verflachten Randes) ein zentrales, äusserst zartes Körnchen, das ein schwarzes, kaum sichtbares Börstchen trägt.

Die Flügeldecken sind parallelseitig, ihre Seitenrandkante ist auch an der Schulter von oben nicht sichtbar, die quere Wölbung ist stark. Es sind Reihen sehr feiner, runder, tief eingestochener Punkte vorhanden. Die Zwischenräume sind sämtlich scharf und hoch erhaben gekörnt, die Körner nur hin und wieder schwach länglich, nur an der Basis sind 1, 3, 5, und 7 kurz gekielt, 1 ist hinten vor der Mitte an, 3, 5, und 7 kürzer hoch und scharf gekielt, der achte Zwischenraum läuft kielförmig in die Spitze, ohne die andern aufzunehmen, er vereinigt sich mit dem ersten.

Das Prosternum ist hinten ganz heruntergebogen, kräftig gefurcht, vorn grob punktiert, das Mesosternum ist kurz V-förmig ausgeschnitten, die Ecken sind verrundet, oben zeigen sich Spuren von kurzer, gelber Behaarung. Hinterbrust und Abdomen sind stark, aber weitläufig punktiert, die Punkte mit äusserst kurzen, anliegenden, sehr feinen Härchen. Die Beine sind zart, die Schienen sehr dünn, sie sind an der Aussenseite nicht sehr auffällig gekielt, die Kiele reichen von der Basis nur wenig über die Mitte, an den Hintertarsen ist Glied 1 gleich 2 und 3, 4 gleich 1 und 2 und 3.

Länge, 7.1 bis 7.8 Millimeter.

Ein Pärchen von Batjan in meiner Sammlung.

Diese Art ist am nächsten mit dem papuanischen *B. seriatus* Gebien verwandt und unterscheidet sich in der Skulptur der Decken und des Pronotums wenig, doch ist die letztere gröber, der erste Zwischenraum ist schon von der Mitte an gekielt, der Rand der Decken ist bei *seriatus* von oben ganz sichtbar und sein Epistom ist sehr kurz, an den Seiten nicht parallel, im Gegensatz zu unserer Art, ferner sind bei *seriatus* die Wangen kräftig S-förmig geschwungen und zeigen keine Spur von Kielen, während bei *batjanensis* die sehr feinen, unvollständigen Kiele nicht zu verkennen sind. Unter den Indo-Malayern hat *B. interstitialis* in Form und Grösse Aehnlichkeit, unterscheidet sich aber durch Kopfbildung und Skulptur weit von ihr, hat feine Sinnesporen an den Fühlern, ungekielte Schienen, und so weiter. Näher steht *B. aratus* Fairmaire, ist aber viel kleiner, mit schmalem Halsschild, dessen Ränder scharf gezähnt sind, ganz ungleichmässigen Zwischenräumen der Decken, scharf und lang gekielte Schienen, und ein wagerechtes Prosternum.

Bradymerus interstitialis Schaufuss.

Bradymerus interstitialis SCHAUFUSS, Horae Soc. Ent. Ross. 21 (1887) 133.

Bradymerus alternatus SCHAUFUSS, Horae Soc. Ent. Ross. 21 (1887) 133.

Da die Beschreibungen der beiden Arten nur sehr bescheidenen Ansprüchen genügen können, erfolgt hier eine neue, zu der mir nicht nur die Typen, sondern noch ein paar weitere Exemplare vorliegen.

Breit und ziemlich flach, Oberseite glänzend schwarzbraun, Fühler und Beine hellbraun.

Der Kopf ist quer, die Augenfalten sind zwar kurz, aber kräftig erhaben, die Augenfurchen tief. Die Wangen sind viel breiter als die Augen, sie liegen aber nur schmal zungenförmig vor ihnen und sind am Ende verrundet; die Seiten des Kopfes vor ihnen sind S-förmig eingezogen verengt, beim Ausgang der kaum angedeuteten Quernaht findet sich keine Incision, die Oberlippe ist scharf quer gekielt. Die Oberfläche ist durch Punktierung und unregelmässige Körnelung rauh. Die Fühler haben ein stark gestrecktes drittes Glied und eine gut abgesetzte 6-gliedrige Keule, bei der auch das erste Glied stark quer ist. Das Mentum ist nur flach gewölbt und hat nur einen schwach angedeuteten Mittelkiel.

Der Halsschild ist über doppelt so breit wie in der Mittellinie lang, die Seiten sind stark gerundet, hinter der Mitte am breitesten, nach vorn stark, nach hinten schwach verengt, die Vorderecken stehen also viel weiter nach innen als die hinteren, welche scharf rechteckig sind, die ersteren ragen weit vor, sind aber an der Spitze verrundet. Die Seiten sind breit verflacht, durch schwache Fälteiung uneben. Die Basis ist durch eine gebogene Querfurche abgesetzt, der Mittelteil des Randes ist viel breiter. Die Seitenrandkante ist krenuliert, aber nicht gezähnt, die Mitte des Vorderrandes ist gerade abgestutzt. Die Scheibe ist fein und weitläufig punktiert, die Seiten daneben punktiert und gekörnt.

Die Flügeldecken sind an der Schulter etwas breiter als die Basis des Halsschildes, die Schulterecken sind gut entwickelt, aber kurz verrundet, der Seitenrand ist breit sichtbar, auch vorn nicht krenuliert, die quere Wölbung ist ziemlich schwach. Es sind Reihen ziemlich tief eingedrückter, nicht eingestochener Punkte vorhanden, sie sind mässig fein, die Zwischenräume 3, 5, 7, und 8 sind mit einem feinen Kiel versehen. Die Kiele sind nicht ganz glatt, besonders 7 und 8 sind, von der Seite gesehen, fein gekerbt. Der achte läuft von der Schulterecke bis in die Spitze, der erste ist nur ganz hinten gekielt, alle sind schwach gewölbt und äusserst fein punktiert, jedes Pünktchen mit abstehendem, sehr feinen Härchen.

Das Prosternum ist flach, hinten etwas gesenkt, das Mesosternum eingedrückt, die Ecken sind verrundet. Die Beine sind kurz, die Schienen dünn, rund, ungekielt.

Länge, 6.5 bis 8.7 Millimeter; Breite, 3 bis 4.1.

Sumatra, Pajakombo (*H. Rouyer*). Sumbawa (*v. Lansberg*). Celebes, Macassar und Bentimurang (*C. Ribbe*).

Zehn Exemplare in den Sammlungen Leyden, Gebien, und Berlin.

Die Art unterscheidet sich von *clathratus,* der gemeinsten des indo-malayischen Gebietes, durch den Glanz der Oberseite, den an den Seiten gekörnten Halsschild, die stark vortretenden Wangen, ganz andere Deckenskulptur, und andere Form des Pronotums mit einem an der Basis gewulsteten Rand. Aehnlicher ist *B. nodicollis,* hat aber alle Zwischenräume gekielt, einen an der Schulter gesägten Rand der Decken, knotige Erhabenheiten auf dem Pronotum, und andere Kopfbildung.

Liest man die Beschreibungen bei Schaufuss nach, möchte man *interstitialis* und *alternatus* für verschiedene Arten halten, sie sind aber, wie die Typen im Berliner Museum ausweisen, identisch, die erstere ist nur etwas dunkler.

Bradymerus spretus sp. nov.

Von der als normal zu betrachtenden Gestalt des gemeinen *B. clathratus,* nur etwas stärker gewölbt, schwarzbraun glänzend, Vorderkörper meist etwas heller, Fühler und Beine hellbraun.

Der Kopf ist kaum breiter als lang, der Vorderkopf ist lang, die Augenfalten sind niedrig und kurz, Augenfurchen kaum ausgeprägt. Die Augen sind ziemlich breit und stark schräg nach vorn gerichtet, die Wangen sind viel breiter als die Augen und liegen lappenförmig vor ihnen, ihr Ende ist aber verrundet, sie sind nicht eingezogen, laufen also dem Vorderrand der Augen nicht parallel, der Winkel, welcher sie von dem fast parallelseitigen Epistom absetzt, ist sehr stumpf. Die Schläfen sind hinter den Augen gut entwickelt und hinten durch eine deutliche (von oben her zu betrachtende) Furche abgesetzt. Die Punktierung ist vor der halbkreisförmigen Querfurche fein, hinten gröber, die Zwischenräume der Punkte bilden kräftige, verworrene Runzeln. Die Fühler haben eine Keule von sechs gut abgesetzten, stark queren Gliedern, Glied 11 ist so breit wie lang.

Das Pronotum ist kaum doppelt so breit wie lang, die Scheibe ist flach, und mit deutlichem mittleren Eindruck versehen. Die Seiten sind breit verflacht, der Seitenrand ist kaum krenuliert, schwach gebogen, hinter der Mitte am breitesten, die Vorderecken ragen lang und spitz vor, die hinteren sind scharf rechtwinklig, die Basis ist an jeder Seite deutlich gerandet, ein Spiegelfleck fehlt. Die Punktierung ist grob und dicht, die

Zwischenräume sind nicht gekörnt, jeder Punkt hat ein zentrales Körnchen ohne Börstchen.

Die Flügeldecken sind stärker gewölbt als bei *clathratus,* ihr Seitenrand ist aber von oben deutlich sichtbar, er ist an der Schulter nicht gesägt. Es sind Streifen sehr feiner, scharf eingestochener, runder Punkte vorhanden. Die Zwischenräume sind gewölbt, jeder (auch der erste von der Mitte an) mit aufgesetztem, sehr feinen Kiel, der mikroskopisch fein gekerbt ist, der achte läuft kielförmig in die Spitze, dort sind 2, 4, 6, und 7 verkürzt und verflacht.

Das Prosternum ist hinten niedergebogen, das Mesosternum breit U-förmig ausgeschnitten, das Abdomen ist fein punktiert. Die Schienen sind schlank, alle haben nur in der Basalhälfte einen sehr feinen, undeutlichen, nur bei guter Vergrösserung sichtbaren Kiel.

Länge, 6 bis 7 Millimeter.

Vier Exemplare in den Sammlungen Berlin, Leyden, und Gebien.

Sumatra, Tandjong Morawa (*Hagen*). Java, Buitenzorg (*A. Preyer*).

Diese Art sieht in der Deckenskulptur, die meist in der Gattung von Art zu Art verschieden ist, dem *B. clathratus* sehr ähnlich, sie unterscheidet sich aber gut durch die verbreiterten Wangen und die feinen Kiele der Schienen, ausserdem durch viel längere, dünnere Tarsen und Hinterbeine.

Bradymerus acutangulus sp. nov. Tafel 1, Fig. 2.

Mattschwarz, Fühler und Tarsen schwarzbraun, gestreckt, fast zylindrisch gewölbt.

Der Kopf ist länger als breit, Augenfalten fehlen, Augenfurchen sind sehr breit und sehr tief und laufen hinten um das Auge herum. Die Wangen sind von Augenbreite, ganz verrundet, der Vorderkopf verengt sich im Bogen, also nicht eingezogen, ein Einschnitt an den Seiten fehlt, die Clypealnaht ist nur durch einen leichten Eindruck gekennzeichnet. Oberlippe ohne Querkiel; die Oberfläche ist dicht und ziemlich grob punktiert, die Zwischenräume sind etwas körnig erhaben und hinten zu Längsrunzeln verflossen. Die Fühler sind kurz, sie haben eine 5-gliedrige, schwach abgesetzte Keule, deren erstes Glied wenig quer ist, auch die folgenden sind nicht sehr breit.

Der Halsschild ist auch an der breitesten Stelle viel schmäler als die Flügeldecken, die Seiten sind stark gebogen, nach vorn und hinten gleich stark verengt, so dass also die scharf rechtwinkligen Hinterecken so weit auseinander stehen wie die vorderen, diese sind heruntergezogen, sehr lang und sehr spitz. Der Seitenrand ist undeutlich und sehr weitläufig gekerbt, sehr schmal verflacht, der Vorderrand leicht vorgezogen, die Punktierung ist grob und sehr dicht, an den Seiten sind die Zwischenräume der Punkte stellenweise etwas körnig.

Die Flügeldecken sind viel breiter als der Halsschild und haben runde Schultern, der glatte Seitenrand ist von oben gerade noch sichtbar. Es sind Reihen kräftiger, tief eingestochener Punkte vorhanden, die Zwischenräume sind ganz flach und haben sämtlich eine Reihe von groben, ungleichen, weitläufigen, stellenweise, besonders hinten, länglichen Körnern. Scharf gekielt ist keiner der Zwischenräume, auch der achte nicht, bei einem Exemplar ist der siebente etwas kielförmig in die Spitze verlängert.

Das Prosternum ist hinten leicht niedergebogen, die Propleuren sind sehr grob punktiert, das Mesosternum ist eingedrückt und hat verrundete Ecken. Das Abdomen ist kräftig punktiert, die Beine sind lang, die Schienen stielrund, ungekielt, bei einem Tier sind die vorderen oben an der Aussenseite mit einem Eindruck versehen, der aber möglicherweise auf eine Störung in der Puppenruhe zurückzuführen ist.

Länge, 6.2 bis 6.6 Millimeter; Breite, 2.8 bis 3.

Zwei Exemplare in den Sammlungen Veth und Gebien.

Java, Preanger (*Sijthoff*); West Java, Tjinisroean, Gono. Kina-Ondera 1,700 Meter, Malabar-Gebirge, März, 1910 (*H. W. v. d. Weele*).

Diese Art ist kaum mit einer andern näher verwandt. Der lange Halsschild mit den spitz vorragenden Vorderecken, die Skulptur der Decken, die tiefen Augenfurchen, die Kopfbildung, und die 5-gliedrige Fühlerkeule machen sie leicht kenntlich. Etwas ähnlich ist *B. aratus*, hat aber einen stark queren Halsschild mit stark gesägtem Rand, eckig vortretende Wangen, gekielte Schienen, 6-gliedrige Fühlerkeule.

Bradymerus sijthoffi sp. nov. Tafel 1, Fig. 3.

Lang und schmal, schwarz oder schwarzbraun, schwach glänzend, Mundteile, Wurzel der Fühler, und Füsse hellbraun.

Der Kopf hat keine Augenfalten oder Tuberkeln, die Augenfurchen sind nur kurz und schwach, die Gegend der Quernaht ist breit eingedrückt, nicht eingeschnitten. Die Wangen sind stark entwickelt, breit verrundet, so breit wie die Augen, und stossen auf diese in kräftigem Winkel. Der stark entwickelte

Vorderkopf ist kaum eingezogen verengt, das Epistom gerade abgestutzt, die Oberlippe ist scharf quergekielt. Die Oberfläche ist nicht granuliert, aber äusserst dicht, fein und sehr deutlich punktiert. Die Fühler sind lang und dünn, Glied 3 ist fast 3 mal so lang wie 2, 2.5 mal so lang wie an der Spitze dick, 4 und 5 sind länger als breit, 6 und 7 so breit wie lang, 8 dreieckig, etwas quer, 9 bis 11 bilden allein die gut abgesetzte Keule, 9 und 10 sind doppelt so breit wie lang, 11 ist sehr gross, so lang wie breit. Das Kinn ist länger als breit, hat eine nach vorn ansteigende, tuberkelähnliche Platte und ist in der Mitte scharf gekielt.

Das Pronotum ist schmäler als die Flügeldecken, 1⅓ mal so breit wie lang, die Seiten sind mässig stark gerundet, vor den Hinterecken leicht ausgeschweift, die Randkante ist nicht gezähnt, sondern nur leicht wellig gekerbt. Die Vorderecken ragen kräftig, aber stumpf vor, die hinteren sind scharf rechtwinklig, die Basis ist kräftig, etwas wulstig gerandet. Die Mitte ist der Länge nach leicht eingedrückt, eine Körnelung fehlt, die Punktierung ist sehr dicht, ziemlich grob, die Punkte sind rund, flach, und haben am Grunde ein mikroskopisches Körnchen.

Die Flügeldecken haben starke Schultern, sie sind parallelseitig, ganz nackt, die Seitenrandkante ist von oben gerade noch sichtbar. Es sind Streifen feiner Punkte vorhanden, die Zwischenräume sind sehr schwach gewölbt, 3, 5, und 7 nur ganz hinten undeutlich etwas erhabener als die andern, der siebente ist auch an der Spitze nicht gekielt. Alle Zwischenräume haben eine Reihe von sehr flachen, rundlichen, nicht deutlichen, weitläufigen Körnern, jedes Körnchen mit Porenpunkt, aber ohne Härchen.

Das Prosternum ist breit, zwischen den Hüften flach doppelfurchig, am Ende halbkreisförmig, dort heruntergedrückt, ziemlich flach. Das Mesosternum hat sehr deutliche, etwas vorragende Ecken, die ersten beiden Abdominalsegmente sind breit eingedrückt. Die Beine sind lang, die Schienen stielrund, ungekielt.

Länge, 6.2 bis 7.2 Millimeter; Breite, 2.4 bis 3.

Zwölf Exemplare in den Sammlungen Berlin, Leyden, Veth, und Gebien.

Java, Preanger (*Sijthoff*).

Diese Art ist durch eine nur 3-gliedrige Fühlerkeule ausgezeichnet und stimmt in diesem Merkmale mit der folgenden und mit *B. granulipennis* Fairmaire überein. Ich kenne die letztgenannte Art nicht; nach der Beschreibung weicht sie wesentlich ab, durch scharf gewinkelte Wangen, granulierten Kopf und Thorax, und ganz andere Deckenskulptur.

Bradymerus drescheri sp. nov.

Bradymerus drescheri ist der vorhergehenden Art so ähnlich dass ich mich darauf beschränken kann, die Unterschiede hervorzuheben. Der Halsschild ist breiter, 1.5 mal so breit wie lang, die Flügeldecken sind matt, die abwechselnden Zwischenräume sind deutlich erhabener als die andern, aber auch bei dieser Art nicht scharf gekielt, 7 ist von der Schulter an gerippt, hinten mit 3 verbunden. Nur die höheren Zwischenräume zeigen unter dem Mikroskop Spuren von Körnchen mit Porenpunkten, sonst sind alle nur äusserst fein lederartig gerunzelt.

Länge, 7 bis 8 Millimeter; Breite, 2.6 bis 2.9.

In den Sammlungen Dahlem, Leyden, Drescher, und Gebien.

Java, Semarang, Juni, 1906 (*Drescher*); Pengalengan, 4,000 Fuss (*Fruhstorfer*).

Bradymerus elongatus (Perty). Tafel 1, Fig. 4.

Boletophagus elongatus PERTY, Col. Ind. Or., München (1831) 40.
Bradymerus javanus FAIRMAIRE, Notes Leyd. Mus. 19 (1897) 217.

Diese Art scheint auf Java beschränkt zu sein, von wo mir aus den verschiedenen Sammlungen ungefähr 60 Tiere vorliegen.

Fairmaire vergleicht seine Art mit *B. granaticollis* aus dem papuanischen Gebiet. Sie ist, wie die Typen Perty's ausweisen, identisch mit *elongatus*. Näher hätte ein Vergleich mit *clathratus* gelegen, der unserer Art nahe verwandt ist. Bei unserer Art aber sind die Wangen etwas breiter als die Augen, das Epistom ist eingezogen verengt, vorn also auf kurze Strecke parallelseitig, der Halsschild ist auffallend flach, mit flach gedrückter, fast furchiger Mittellinie, die Seiten sind kräftig gewellt, aber nicht gezähnt, die Basis ist ungerandet. Von den Deckenkielen sind vorn nur 3, 5, und 7 scharf, 4 und 6 dort stark verkürzt oder in einzelne weitläufige Körner aufgelöst. An der Spitze sind 1, 3, 5, 7, und 8 scharf gekielt, die andern fehlen. Das Mentum ist schärfer gekielt, die Schienen haben ebenfalls keine Kiele.

Java, Malang; Flügger-Gebirge; Preanger (*Sijthoff*); Preanger, 4,000 bis 6,000 Fuss (*Warburg*); Pengalengan, 4,000 Fuss (*Fruhstorfer*); Toegoe (*Pasteur*); Goetji Tagal (*Th. T. Lucassen*); Sukabumi (*Fruhstorfer*); Tengger-Gebirge, 4,000 Fuss (*Fruhstorfer*).

In den Sammlungen Berlin, Dahlem, Hamburg, München, Leyden, Drescher, und Gebien.

Bradymerus seminitidus Arrow.

Bradymerus seminitidus ARROW, Abeille 14 (1876) 106.

Auch bei der Beschreibung dieser Art sind einige Ergänzungen nötig, die ich nach vier Cotypen des Berliner Museums gebe, von denen mir eine für meine Sammlung überlassen wurde.

Der Kopf ist so breit wie lang, Augenfalten fehlen, die Augenfurchen sind schwach, anliegend, unauffällig, die Wangen haben Augenbreite und sind ganz verrundet, nicht eingezogen verengt, die halbkreisförmige Quernaht ist eingedrückt. Die Punktierung ist sehr fein, dicht gedrängt, hinten körnig. Das erste Glied der 6-gliedrigen Keule, die gut abgesetzt ist, ist so breit wie lang, die folgenden sind quer. Der Halsschild ist nicht ganz doppelt so breit wie lang, die Seiten sind nicht gekerbt, die Verflachung jederseits nicht auffällig, die Vorderecken ragen stark vor, die Hinterecken sind rechtwinklig, nach hinten gerichtet, weil die Basis stark doppelbuchtig ist. Die Mittelfurche ist nicht so tief wie man nach Arrow's Beschreibung vermuten könnte. Die Körnchen in den Zwischenräumen der Punkte sind wie abgeschliffen. Die Flügeldecken sind auf der Scheibe flachgedrückt, die Seiten fallen senkrecht ab, doch ist der auch vorn glatte Seitenrand von oben überall sichtbar. Die Zwischenräume sind flach gewölbt und bis auf dem zweiten sämtlich mit feinem Kiel versehen, 1, 3, 5, und 7 laufen bis an die Basis, 2, 4, und 6 sind dort, ebenso hinten, etwas verkürzt und an der Spitze etwas in Körner aufgelöst, 8 läuft scharf gekielt in die Spitze. Die Kiele sind nicht glatt, sondern bei guter Vergrösserung oben sehr deutlich gekerbt, oder auf der Schneide in längliche, zusammenhängende Körnchen geteilt, nicht unterbrochen. Das Prosternum ist hinten ganz niedergebogen, aber mit feiner Spitze versehen; es ist scharf doppelfurchig. Die Ecken des V-förmig ausgeschnittenen Mesosternums sind sehr deutlich. Das Abdomen ist nicht eingedrückt. Die Schienen sind ungekielt.

Länge, 7 bis 9 Millimeter.

Auf der Insel Christmas (südlich von Java) häufig.

Den metallischen Glanz, von dem der Autor redet, kann ich nicht finden, die Art gehört vielmehr in die zweite Abteilung. Sie steht dem *B. clathratus* am nächsten, besonders auch in der Skulptur der Decken, ist aber auffallend schmal, hat feine abgeschliffene Körner auf Kopf und Pronotum, keinen Kiel auf dem neunten Zwischenraum, der achte ist nur von der Mitte an scharf gekielt.

Bradymerus clathratus Schaufuss.

Bradymerus clathratus SCHAUFUSS, Horae Soc. Ent. Ross. **21** (1887) 134.

Bradymerus aequecostatus FAIRMAIRE, Notes Leyd. Mus. **15** (1893) 20.

Ueber die Identität der beiden Arten bin ich nicht im Zweifel, da mir sowohl von *clathratus* als auch *aequecostatus* Typen vorgelegen haben. Trotzdem also zwei Beschreibungen der Art vorliegen, sind Ergänzungen nötig, denn in beiden werden wichtige Merkmale mit Stillschweigen übergangen.

Die Wangen haben Augenbreite und sind ganz verrundet, die Clypealnaht ist gut ausgeprägt, die Augenfurchen sind tief. Das Pronotum ist an der Basis kräftig gerandet, die Mittellinie ist der Länge nach vertieft, die Punktierung sehr dicht, aber nicht fein, die Zwischenräume sind stellenweise erhaben, aber nicht deutlich gekörnt.

Auf den Flügeldecken sind vom dritten Zwischenraume an alle gekielt, die Kiele fein aufgesetzt und höchst fein gekerbt, an der Spitze sind 1, 3, 5, und 8 allein erhaben, der letztere läuft kielförmig in die Spitze. Das Prosternum ist hinten schwach gesenkt und fällt dann steil ab, das Mesosternum ist tief und ziemlich steilkantig eingedrückt, die Schienen haben keine Kiele.

Diese Art ist die verbreitetste und häufigste der Gattung. Mir liegen aus den verschiedenen Sammlungen 190 Tiere vor.

Ober-Assam (*Hartert*). Formosa, zahlreiche Fundorte (*H. Sauter*). Andamanen (*Roepstorff*). Nias (*v. Hasselt*). Sumatra, Manna (*Knappert*); Tebing-tinggi (*Schultheiss*); Ober Langkat; Palembang (*Knappert*); Serdang, Tandjong Morawa (*Hagen*); Serdang, Singkal (*v. Hasselt*); Lampong Distrikt; Soekadam (*v. Hasselt*); Tambang Salida (*J. L. Weyers*); Indragiri (*v. Hasselt*); Soekaranda (*Dohrn*). Java, Semarang, September, 1905 (*Drescher*); Tjilatjap, November, 1911 (*Drescher*). Borneo, Kinabalu (*Waterstradt*); Boven Mahakkam (*Nieuwenhuis*); Mocara teweh (*Semmelinck*); Borneo Central (*Piepers*). Philippinen: Luzon, Tayabas: Benguet: Nueva Vizcaya. Mindanao. Palawan. Basilan. Süd Celebes, Bentimurang (*Ribbe*).

Bradymerus acuticostis sp. nov.

Gestreckt, fast zylindrisch gewölbt, noch schlanker als der gemeine *B. clathratus*, sonst ihm sehr ähnlich. Schwarz, matt, Hinterkörper nach Reinigung etwas glänzend, Grundglieder der Fühler und Füsse braun.

Der Kopf ist lang, die Wangen haben Augenbreite und sind ganz verrundet, der Vorderkopf ist stark entwickelt, er ist stark und fast geradlinig nach vorn verengt. Die Ecken des Epistoms sind breit verrundet und liegen in einer Linie mit den Innenecken der Augen, der Vorderrand ist gerade abgestutzt. In der Gegend der sehr feinen und vollständigen Quernaht ist der Kopf wie bei *clathratus* verflacht eingedrückt. Die Punktierung ist ausserordentlich fein und eng, hinten fliessen die Zwischenräume der Punkte zu kurzen körnigen Rünzelchen zusammen. Die Augenfurchen sind tief, die Augenfalten kurz und nicht sehr deutlich. Die Fühler haben eine stark abgesetzte Keule von sechs queren Gliedern; auch das erste Glied der Keule ist viel breiter als lang.

Der Halsschild ist ganz wie bei *clathratus* gebildet, also halb so lang wie an der breitesten Stelle breit. Der Seitenrand ist schwach uneben, die Seiten sind verflacht, die Mittellinie ist breit und flach eingedrückt. Die grösste Breite liegt in der Mitte; nach hinten hin ist die Verengung schwach, nach vorn stark. Die Vorderecken ragen ziemlich lang und spitz vor, die hinteren sind scharf rechtwinklig. Die Basis ist dick gerandet, aber die Punktierung ist viel gröber als bei der alten Art und die Zwischenräume der Punkte bilden scharf erhabene, verworrene, kurze Runzeln, keine Körner.

Die Flügeldecken sind fast zylindrisch gewölbt, der Seitenrand ist glatt und von oben nicht sichtbar. Alle Zwischenräume sind scharf gekielt, die Kiele viel höher erhaben als bei *clathratus* und sämtlich kräftig gekörnt. Die ungeraden Kiele sind der ganzen Länge nach erhaben, die geraden vorn und hinten verkürzt, der achte läuft in die Spitze. Die Punkte der Reihen sind grob, es stehen ungefähr 36 im vierten Streif (bei *clathratus* etwa 50). Die Körnchen des ersten und zweiten Kieles sind sehr fein, niedrig, und fast rund, die der andern dagegen schärfer und länglich. Die Unterseite ist ziemlich blank, das Prosternum hinten schwach gesenkt und fällt dann steil ab, das Abdomen ist fein und nicht gedrängt punktiert. Die geraden Schienen haben keine Spur von Kielen.

Länge, 6.5 Millimeter.

Leyte, Tacloban (ex coll. *Schultze*), zwei Exemplare.

Die Art ist sehr nahe mit *B. clathratus* (= *aequecostatus*) verwandt, von gleicher Grösse aber etwas schlanker, mit schwarzer Fühlerkeule, der Halsschild ist grob punktiert und die Zwischenräume der Punkte sind viel stärker runzlig, die Kiele der Decken sind höher, auch die ersten Zwischenräume sind gekielt, und die mittleren und äusseren sind scharf und kräftig granuliert. Die Punkte sind gröber und in den Reihen minder zahlreich als bei der Art von Schaufuss. Ausser den vorstehend beschriebenen Arten gibt es im indo-malayischen Gebiet noch einige mir in Natur unbekannte, von denen ich die Beschreibung wiederhole, wie folgt:

Bradymerus grandis Fairmaire.[7]

Oblongus, sat fortiter convexus, sed dorso planiusculus, fuscus, nitidus, fere metallescens; capite dense rugosulo-punctato, sutura clypeali parum impressa, margine antico obsolete sinuato, antennis piceo-rufis, gracilibus, apice paulo clavatis; prothorace valde transverso, elytris angustiore, antice et basi fere aequilato, lateribus rotundatis, basi tantum sinuatis, margine postico medio rotundatim lobato, utrinque sat fortiter sinuato, angulis posticis sat acutis, dorso dense ac fortiter asperato, basi sat fortiter marginato et laeviore, angulis anticis sat productis; scutello minuto, triangulari; elytris ovatis, basi truncatis, apice obtusis, cum sutura fortiter et acute carinatis, carina praescutellari brevissima, interstitiis concavis, clathrato-foveolatis, subtus parce punctulatus, abdomine strigoso-punctato, pedibus dense rugosis.

Hab. Java orient: Bezoeki (Semmelink et Groen)—2 Exemplaires du Musèe de Leide.

Ressemble assez au *B. granaticollis* Fairm., mais un peu plus grand, le corselet n'est pas crénelé sur les côtés, les angles antérieurs sont moins saillants, les carènes des élytres sont bien plus tranchantes, entières, et les interstices, bien plus larges, sont rempli par des fossettes peu profondes, separées par des plis transversaux; la carène préscutellaire est courte mais bien marquée.

Bradymerus granulipennis Fairmaire.[8]

Long 7 mm.—Oblongus, sat convexus, fuscus, indumento terreno vestitus; capite sat lato, brevi, genis angulatim dilatatis, sat dense granulato, clypeo utrinque foveato, antennis brevibus, articulis 3 ultimis dilatatis, brevibus; prothorace elytris vix angustiore, valde transverso, subquadrato, antice haud angustiore, lateribus vix arcuatis, dorso dense asperato-granuloso; margine postico leviter bisinuato; angulis omnibus fere rectis; scutello sat lato, obtuso; elytris ad humeros sat rotundatis, apice obtuso, striatulis, intervallis seriatim parum regulariter tuberculatis, alternatim paulo convexiusculis; subtus nitidior, asperulo punctulatus, pedibus sat brevibus, femoribus crassiusculis.

Hab. Bornéo occ.: Sambas (Dr. J. Bosscha).—Un seul exemplaire du Musée de Leide.

La granulation assez fine et assez serrée des élytres fera reconnaitre facilement cette espèce. L'unique individu est recouvert d'un enduit terreux qui disparaitrait peut-être par un lavage malheureusement dangereux pour l'etat de conservation de l'insecte.

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[7] Notes Leyd. Mus. 15 (1893) 19.
[8] Notes Leyd. Mus. 15 (1893) 20.

Wie oben erwähnt, ist durch die zahlreichen Neubeschreibungen, Veränderungen, und die Auslassungen ein neuer Katalog der *Bradymerus*-Arten nötig, der hiermit folgt:

KATALOG DER BIS JETZT BESCHRIEBENEN BRADYMERUS-ARTEN[9]

BRADYMERUS Perroud (*Isostira* Pascoe, Col. Cat., page 344).

- **acutangulus** sp. nov.; Java.
- **acuticostis** sp. nov.; Philippinen.
- *aequecostatus* Fairmaire, Col. Cat., p. 356 = **clathratus** Schaufuss.
- **aeratus** sp. nov.; Ceylon.
- *alaticollis* Fairmaire = genus **Gonocephalum**, Col. Cat., p. 356.
- *alternatus* Schaufuss = **interstitialis** Schaufuss, Col. Cat., p. 356.
- **alternicostis** Gebien, Philip. Journ. Sci. § D **8** (1913) 377, 381; Philippinen.
- **andamanus** Gebien, Notes Leyd. Mus. **36** (1914) 63; Andamanen.
- **anicorum** Fairmaire, Col. Cat., p. 356.
  - *tuberculatus* Perroud.
- **aratus** Fairmaire, Col. Cat., p. 356; Sumatra, Borneo.
  - *interruptus* Gebien, Saraw. Mus. Journ. **2** (1914) 12.
- **aspericollis** Fairmaire, Col. Cat., p. 357.
- **batjanensis** sp. nov.; Batjan.
- *bidentulus* Fairmaire = **Gonocephalum minusculum**.
- **caeruleipennis** Gebien, Philip. Journ. Sci. § D **8** (1913) 380; Philippinen.
- **cancellatus** Fairmaire, Col. Cat., p. 356.
- **carinatus** Fairmaire, Col. Cat., p. 356; Philippinen.
  - *corinthius* Fairmaire.
- **celebensis** sp. nov.; Celebes.
- **clathratus** Schaufuss, Col. Cat., p. 356; Hinterindien, Formosa.
  - *aequecostatus* Fairmaire; Sunda-Inseln, Andamanen, Philippinen.
- **convexicollis** Fairmaire, Col. Cat., p. 356.
- *corinthius* Fairmaire, Col. Cat., p. 356 = **carinatus**.
- **crenata** Pascoe, Col. Cat., p. 344.
- **crenulicollis** Fairmaire, Col. Cat., p. 356; Sunda-Inseln.
  - *denticeps* Gebien, Saraw. Mus. Journ. **2** (1914) 11.
- **cucullatus** Fairmaire, Col. Cat., p. 356; Indien.
- **cyaneipennis** Pascoe, Col. Cat., p. 356; Ceylon.
- *denticeps* Gebien = **crenulicollis** Fairmaire; Borneo.
- **drescheri** sp. nov.; Java.
- *elongatus* Gebien nec Perty, Philip. Journ. Sci. § D **8** (1913) 376 = **pertyi** Gebien; Philippinen.
- **elongatus** (Perty), Col. Cat., p. 356; Java.
  - *javanus* Fairmaire, Col. Cat., p. 356.
- **ferruginipes** Fairmaire, Col. Cat., p. 356; Philippinen.

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[9] Um dieses kurze Verzeichnis nicht zu sehr durch Litteraturangaben zu belasten, gebe ich bei den bekannten Arten nur einen Hinweis auf den Coleopterorum Catalogus.

granaticollis Fairmaire, Col. Cat., p. 356.
grandis Fairmaire, Col. Cat., p. 356; Java.
granulipennis Fairmaire, Col. Cat., p. 356.
helleri Gebien, Nova Guinea **13** (1920) 248; Neu-Guinea.
impressicollis Gebien, Philip. Journ. Sci. § D **8** (1913) 378; Philippinen.
incostatus Gebien, Notes Leyd. Mus. **36** (1914) 62; **Sumatra**, Java, Simalur.
integer Gebien, Nova Guinea **13** (1920) 244; Insel **Dammer**.
interruptus Gebien = **aratus** Fairmaire; **Borneo**.
interstitialis Schaufuss, Col. Cat., p. 356; **Sumatra**, Celebes, Sumbawa.
  alternatus Schaufuss, Col. Cat., p. 356.
javanus Fairmaire, Col. Cat., p. 356 = **elongatus** Perty nec Gebien.
kuntzeni Gebien, Nova Guinea **13** (1920) 246; Neu-Guinea.
lobicollis Gebien, Nova Guinea **13** (1920) 240; Neu-Guinea.
mcgregori Gebien, Philip. Journ. Sci. **19** (1921) 446; Philippinen.
macrogonus Gebien, Nova Guinea **13** (1920) 250; Neu-Guinea.
modestus Fairmaire = genus **Gonocephalum**.
nigerrimus Gebien, Nova Guinea **13** (1920) 245; Neu-Guinea.
nodicollis sp. nov.; Java, Sumatra.
pertyi Gebien, Philip. Journ. Sci. **19** (1921) 446; Philippinen.
  elongatus Gebien, Philip. Journ. Sci. § D **8** (1913) 376 nec **elongatus** Perty.
pici Chatin, Bull. Fr. (1913) 311, f. 1; Zanzibar.
plicicollis Fairmaire, Col. Cat., p. 526.
principatus Gebien, Nova Guinea **13** (1920) 241; Neu-Guinea.
raucipennis Blackburn, Col. Cat., p. 344.
regularis Gebien, Nova Guinea **13** (1920) 242; Neu-Guinea.
rugatulus Fairmaire, Col. Cat., p. 356 = genus **Gonocephalum**.
rugipleuris Gebien, Nova Guinea **13** (1920) 249; Insel Batjan, Banda.
semiasperatus Fairmaire, Col. Cat., p. 356.
seminitidus Arrow, Col. Cat., p. 356; Insel Christmas.
seriatus Gebien, Nova Guinea **13** (1920) 243; Neu-Guinea.
serricollis (Walker), Col. Cat., p. 356.
sijthoffi sp. nov.; Java.
spinicollis Fairm. = ? genus **Gonocephalum**.
spretus sp. nov.; Sumatra, Java.
sublaevicollis Fairmaire, Col. Cat., p. 356.
trobriandensis Gebien, Nova Guinea **13** (1920) 247; Insel Trobriand.
tuberculatus Perroud = **amicorum** Fairmaire.
violaceus Pascoe, Col. Cat., p. 356; Philippinen.

Genus **CHAETOPSIA** novum

Geflügelt, gestreckt zylindrisch, schwarzbraun.

Kopf geneigt, ungehörnt, breit, fast so breit wie das Pronotum, Vorderkopf sehr kurz, Augen ungeteilt, nur wenig durch die Wangen eingeengt, die Oberfläche der Augen durch aufstehende, kurze Borsten rauh. Augenfurchen tief und schmal, vorn dem Auge eng anliegend, hinten sich von ihm entfernend;

sie schnüren dort die Schläfen ab, welche den Augen scharf plattenförmig anliegen, an den Seiten scharfwinklig sind und viel schmäler als die Augen, der Hinterkopf ist also zu einem dünnen Hals verengt. Die Wangen sind schmäler als die Augen, das Epistom ist gerade abgestutzt, die Oberlippe hat keinen Querkiel. Die Clypealnaht ist stark eingedrückt. Die Fühler sind lang und dünn, mit 6-gliedriger Keule versehen. Der Unterkopf ist fast ausgehöhlt, ohne Fühlerfurche, die Augen stossen an den Maxillarausschnitt, letztes Glied der Palpen beilförmig, Mandibeln 2-spitzig. Pronotum sehr schmal, Vorderrand über den Kopf vorgezogen, Seiten senkrecht, aber mit Randkante. Flügeldecken mit kräftigen Schultern, zylindrisch, mit unterbrochenen Rippen. Prosternum vorn und hinten fast senkrecht abfallend, aber vor den Hüften gut entwickelt, Mesosternum einfach abschüssig ohne Eindruck. Schenkel einfach, unten ungekantet, bei einer zweiten, mir in einem Einzelstück vorhandenen Art, die ich nicht beschreibe, oben am Ende mit Knoten, daher bei dieser das Ende breit abgeschnitten. Schienen ungekielt, das Ende aussen schräg abgeschnitten, die Tarsenglieder am Ende nicht abgeschrägt, sondern senkrecht aneinander gesetzt. Das Klauenglied ungefähr so lang wie die übrigen Glieder zusammengenommen.

Diese Gattung hat habituell etwas Aehnlichkeit mit *Dicraeosis,* wegen des gestreckten, zylindrischen Körpers, den vorn leicht kapuzenförmig über den Kopf gezogenen Halsschild, den kurzen Vorderkopf, vorn und hinten senkrechtes Prosternum. Aber die Kopfbildung ist ganz anders, die Schläfen liegen plattenförmig auf, die Fühlerkeule ist 6-gliedrig, der Halsschild hat an den Seiten eine vollständige Randkante, der Unterkopf ist ganz anders gebildet. Von allen Boletophagiden-Gattungen unterscheidet sich unsere sofort durch die beborsteten Augen, ein Charakter der sich überhaupt nur bei wenigen Gattungen der Tenebrioniden findet, zum Beispiel bei *Leichenum* und der neuseeländischen *Tarphiomimus* (*Etazeta*). Flüchtige Aehnlichkeit hat auch *Dysantes,* unterscheidet sich aber durch gehörnten Thorax, ganz andere Fühler, dicke, nicht plattenförmige Schläfen, eckiges Mesosternum, und besonders durch fehlende Gelenkhaut zwischen den letzten Abdominalsegmenten.

Chaetopsia angusticollis sp. nov.

Gestreckt zylindrisch, schwarzbraun, matt, nur die Erhabenheiten glänzend, der ganze Körper sehr kurz abstehend, sparsam beborstet.

Der Kopf ist breiter als lang, die Augen sind sehr gross, die Wangen sind schmäler, ganz verrundet, flach. Der Vorderkopf ist nicht eingezogen verengt, das Epistom gerade. Die Augenfurchen gehen vorn um das Auge herum und scheiden die Wangen fein ab, die Schläfen sind plattenförmig abgesetzt, der Hals hinten ist kaum breiter als die Stirn zwischen den Augen, diese sind halb so breit wie die Stirn. Die Clypealsutur ist tief eingedrückt und bildet einen Viertelkreisbogen, das Epistom ist leicht aufgeworfen. Der Hinterkopf ist dicht körnig punktiert. Die Fühler sind dünn, sie erreichen fast die Mitte des Pronotums. Glied 1 ist das dickste und längste, 2 dicker als 3, dieses kürzer als 4 und 5 zusammen, beide sind leicht quer, rundlich, die letzten sechs bilden eine gut abgesetzte Keule von stark queren Gliedern, sie sitzen mit kurzen Stielchen aufeinander und haben grobe Sinnesporen; die vorletzten Glieder sind ungefähr 3 mal so breit wie lang, das letzte so breit wie lang. Der Unterkopf ist quer breit eingedrückt als Fortsetzung der Augenfurche, das Mentum ist flach gewölbt, ungekielt.

Das Pronotum ist kaum breiter als eine Flügeldecke, in der Mittellinie länger als vorn breit. Der ganze Vorderrand ist kräftig vorgezogen, vorn, ziemlich dick, die Seiten sind gerade, schwach nach hinten verengt, die Vorderecken kurz verrundet, sehr stumpf, die hinteren fast rechtwinklig. Die Seiten sind nahezu senkrecht, nur vorn schwach verflacht, die Randkante ist vollständig. Die ganze Oberfläche ist dicht körnig punktiert, vor der fein gerandeten Basis finden sich einige breite, flache Eindrücke.

Die Flügeldecken sind parallelseitig, zylindrisch gewölbt. Es sind Reihen von sehr feinen, eingestochenen, nicht eingedrückten Punkten vorhanden, die dicht stehen. Die Zwischenräume sind gekörnt, meist sind die Körner in den Reihen 3, 5, und 7 stark länglich und oben quer gerieft. Die Skulptur ist recht variabel. Unterseite und Beine wie in der Gattungsbeschreibung angegeben, die Schenkel am Ende einfach.

Länge, 5.5 bis 6.6 Millimeter; Breite, 1.8 bis 2.2.

Sumatra, Manna (*Knappert*). Java, Preanger (*Sijthoff*).

In der Sammlung Veth und meiner eigenen.

Ausser dieser Art liegt mir noch eine zweite, sehr ähnliche von Java (Toegoe) aus dem Leydener Museum vor, die aber kleiner ist und sich besonders durch die am Ende schwielig verdickten Schenkel, durch den vorn mit zwei Längserhabenheiten versehenen Halsschild, dessen Seitenrandkante sehr fein gesägt ist.

Genus **DANODEMA** novum

Lang gestreckt, zylindrisch, geflügelt, nach hinten schwach erweitert. Kopf frei, senkrecht, nicht unter dem Vorderrand des Pronotums verborgen. Augen gross, vorquellend, grob fazettiert, durch die Wangen wenig eingeengt, diese viel schmäler als die Augen, rund. Am Innenrand der Augen befindet sich eine tiefe, schmale Augenfurche, welche sich nach hinten fortsetzt und die dicken Schläfen abschnürt. Die Clypealnaht ist breit eingedrückt, das Epistom gerade abgestutzt, die Oberlippe liegt ganz frei und ist am Grunde nicht quer gekielt. Die Fühler sind 11-gliedrig, lang und ziemlich dünn, Glied 2 gleich 4, 3 gestreckt, es ist eine 7-gliedrige Keule von immer stärker quer werdenden Gliedern vorhanden, das letzte Glied ist frei. Unterkopf geknickt, die Kehle rechtwinklig von den Mundteilen abgesetzt. Endglied der Maxillarpalpen breit beilförmig, Mandibeln am Ende kurz gefurcht und geteilt, Fühlerfurchen fehlen.

Halsschild mit leicht vorgezogenem Vorderrand, aber ohne Kapuze, Seitenrandkanten fehlen, Vorderwinkel verrundet, aber durch eine schwache Randung angedeutet, Basis nicht deutlich gerandet. Schildchen parallelseitig, etwas länger als breit, schwach erhaben.

Flügeldecken mit kräftigen Schultern, ohne Höcker, Epipleuren beim Beginn des letzten Abdominalsegments verkürzt.

Prosternum vorn gut enwickelt, vor den Hüften flach, vorn leicht ausgehöhlt, die Hüften dort nicht spiegelblank und abgeschliffen, sondern rund. Hinten ist das Prosternum ganz niedergedrückt, Mesosternum nicht grubig eingedrückt. Interkoxalfortsatz ziemlich schmal, Schenkel mässig dick, rund, unten ohne Kante, ungezähnt, Schienen rund, ohne Kiele oder andere Auszeichnung, Enddornen der Schienen fehlen. Tarsenglieder gerade aneinandergesetzt, das Endglied gestreckt, die ersten Glieder der Vordertarsen nicht erweitert.

Diese Gattung ist von allen asiatischen Boletophagiden ausser der Gattung *Dicraeosis* durch den gestreckten zylindrischen Körper und ungekanteten Halsschild unterschieden, überdies von *Atasthalus, Bolitoxenus,* und *Bolitonaeus* durch freies elftes Fühlerglied und fehlende Fühlerfurche auf der Unterseite des Kopfes, von *Sumbawia* und *Boletophagus* durch ungeteilte Augen, von *Byrsax* durch fehlende Fühlerfurchen, ganz andere Körperform, ungekerbten Körperrand und ungehörnten Kopf. Der nächste Verwandte ist *Dicraeosis,* von dem sich *Danodema* durch nicht kapuzenförmig ausgebildeten Halsschild, dicken Hinterkopf, ganz andern Fühlerbau, stark verkürzte Epipleuren, und ganz andere Prosternumbildung unterscheidet.

Danodema subcalvum sp. nov. Tafel 1, Fig. 5.

Gestreckt zylindrisch, schwarzbraun, matt, fast nackt.

Der Kopf ist äusserst dicht und fein, aber sehr deutlich rauh punktiert, er ist bei den Augen gemessen am breitesten, die Wangen sind wesentlich schmäler, geradlinig nach vorn verengt, das Epistom ist fast gerade abgeschnitten, nur sehr schwach und breit ausgerandet. Der Hinterkopf ist geschwollen, die Clypealnaht kräftig eingedrückt. Die Augenfurchen sind sehr tief und schmal und setzen sich, die Schläfen abschnürend, auf den Unterkopf als Kehlfurche fort. Die Fühler überragen die Mitte des Pronotums, Glied 1 ist nicht sehr gross, nicht gezähnt, 2 sehr deutlich, 3 doppelt so lang wie dick, etwas gebogen, 4 so lang wei breit, 5 bis 11 bilden eine gut abgesetzte, aber sehr lockere Keule, von welcher die vier vorletzten Glieder fast doppelt so breit wie lang sind; alle sitzen auf kurzen Stielchen, 11 ist so breit wie lang.

Der Halsschild ist etwas länger als breit, der Vorderrand ist in leichtem Bogen vorgezogen. Von oben gesehen sind die Seiten gerundet, die Randkante ist nur bei den ganz verrundeten Vorderecken angedeutet, die Basis ist undeutlich gerandet, in der Mitte der Basis findet sich eine ganz leichte Depression. Die Punktierung ist dicht gedrängt, fein aber sehr deutlich.

Die Flügeldecken sind hinten schwach erweitert, in der Längsrichtung schwach gewölbt, vom letzten Drittel an abschüssig. Es sind ziemlich tiefe Punktstreifen vorhanden, deren Punkte fein, rund, und tief sind und nur bei guter Vergrösserung deutlich werden. Die gleichmässig und kräftig gewölbten Zwischenräume sind sehr dicht, fein gekörnt. Unter dem Mikroskop zeigt jedes Körnchen ein äusserst kurzes und ganz unauffälliges Börstchen. Unterseite und Beine wie in der Gattungsbeschreibung angegeben.

Länge, 7 Millimeter; Breite, 2.3.

Ein Exemplar von Süd-Indien, Trichinopoly, in meiner Sammlung.

Genus **DICRAEOSIS** Gebien

Dicraeosis GEBIEN, Col. Cat. (1910–1911) 355.

Dicraeus MARSEUL, Ann. Soc. Ent. France V 2 (1876) 103, 104 (nom. praeocc.).

Stenochinus MOTSCHULSKY nom. nud. Gebien, Col. Cat. (1910–1911) 610.

? *Brachypilium* FAIRMAIRE, Ann. Soc. Ent. Belg. 40 (1896) 23.

Diese Gattung mit den auffälligen Formen macht kaum den Eindruck einer Tenebrionide, sondern eher den einer Bostrychide (Apatide), oder wie Motschulsky glaubt, einer Elmide. Ob *Brachypilium* sicher zu unserer Gattung gehört weiss ich nicht, da mir die Type unbekannt ist. Die Beschreibung bei Fairmaire passt in allen Stücken auf Arten der Gattung *Dicraeosis.* Doch schreibt der Verfasser dass das zweite Glied der Fühler undeutlich sei; bei unserer Gattung ist es aber sehr deutlich, dicker als 3. Wahrscheinlich liegt einer der bei Fairmaire häufigen Beobachtungsfehler vor. Da ich aber in dieser Beziehung nicht sicher bin, darf ich dem Namen *Brachypilium* keine Prioritätsrechte einräumen. Die beschriebene Art *B. sculpturatum* muss meinem *Dicraeosis nodipennis,* vom gleichen Fundort, ähnlich sein.

Stenochinus reticulatus Motschulsky ist ohne Zweifel ein *Dicraeosis;* er ist ungenügend beschrieben und fällt vielleicht mit Fairmaire's Art zusammen. Der Autor stellt die Art, ohne irgend welche Verwandtschaftsbeziehungen anzugeben, zu den Tenebrioniden. Da niemand bisher eine Deutung versuchte, stand das Tier am Ende des Systems neben einigen anderen, ebenfalls bisher ungedeuteten Gattungen. Eine Gattungsbeschreibung versuchte Motschulsky mit keinem Wort. Der Name *Stenochinus* hat also, trotzdem er der älteste der oben genannten ist, keinerlei Vorrechte vor den andern.

Der Coleopterum Catalogus, pars 28, führt nur die eine typische Art von Marseul auf. Die Gattung umfasst aber (unter der Voraussetzung das *Brachypilium* mit ihr zusammenfällt) 9 Arten, nämlich:

Dicraeosis acutus Gebien, Arch. f. Naturg. 79, 1913 (1914) Abt. A, Heft 9, 14.

Dicraeosis amplus Gebien, Arch. f. Naturg. 79, 1913 (1914) Abt. A, Heft 9, 8.

Dicraeosis bacillus Marseul, Ann. Soc. Ent. France V 6 (1876) 103; Gebien, Arch. f. Naturg. 79, 1913 (1914) Abt. A, Heft 9, 13.

Dicraeosis carinatus Gebien, Arch. f. Naturg. 79, 1913 (1914) Abt. A, Heft 9, 12, t. 1, fig. 9.

Dicraeosis cylindricus Gebien, Arch. f. Naturg. 79, 1913 (1914) Abt. A, Heft 9, 9, t. 1, f. 7.

Dicraeosis nodipennis Gebien, Arch. f. Naturg. 79, 1913 (1914) Abt. A, Heft 9, 14.

Dicraeosis reticulatus Motschulsky, Etudes Entom. 8 (1859) 102.

Dicraeosis sauteri Gebien, Arch. f. Naturg. 79, 1913 (1914) Abt. A, Heft 9, 11.

Dicraeosis sculpturatus Fairmaire, Ann. Soc. Ent. Belg. 40 (1896) 24.

Marseul's Beschreibung der Gattung kann nur bescheidenen Ansprüchen genügen. Sie ist überdies nur auf die eine ihm bekannte Art von Japan zugeschnitten. Eine andere, ausführliche Beschreibung ist daher nötig.

Beschreibung der Gattung.—Der Körper ist langgestreckt zylindrisch, geflügelt, schwarzbraun, ohne Höcker. Kopf in beiden Geschlechtern gleich, ungehörnt, Epistom leicht bogig vorgezogen oder gerade abgestutzt, nicht ausgezeichnet, Oberlippe frei, Augen gross, durch die Wangen eingeengt, nicht geteilt, innen und hinten von einer tiefen Augenfurche begleitet, eine Clypealnaht fehlt. Fühler kurz, Glied 2 deutlich, 3 gestreckt, die letzten drei oder vier Glieder bilden eine starke Keule, das elfte Glied ist das grösste. Die Teile des Unterkopfes sind in normaler Haltung des stark untergebogenen Kopfes vom Prosternum verdeckt. Endglied der Maxillarpalpen beilförmig, eine Fühlerfurche fehlt, es ist also der Raum zwischen Maxillen und Augen nicht durch eine hohe überstehende Kante ausgefüllt und die Mundteile liegen nicht hoch. Mandibeln am Ende leicht geteilt.

Halsschild länger als breit, zylindrisch, an den Seiten ganz ungekantet, mit spitzen Vorderwinkeln, die Mitte des Vorderrandes ist spitz oder stumpf kapuzenförmig über den Kopf gezogen, der von oben nicht sichtbar ist. Hörner oder andere Geschlechtsauszeichnungen fehlen, die Basis ist ungerandet, die Skulptur besteht aus dichten groben Punkten, zwischen denen sich schuppenförmige Haare finden. Das Schildchen ist fast kreisrund und liegt etwas erhaben.

Die Flügeldecken haben starke Schultern und sind parallelseitig, die Basis ist scharf gekantet, die Skulptur besteht aus Reihen grober Punkte mit flachem Grunde, meist finden sich am Rande jedes Punktes feine Körnchen; die Epipleuren sind vollständig.

Das Prosternum ist mit den Hüften zusammen hoch erhaben, fällt vorn senkrecht ab und bildet eine Artikulationsfläche für den Unterkopf, da es vorn breit ausgeschnitten ist, die Hüften sind dort spiegelblank. Die Platte des Prosternums ist vorn scharfkantig oder hängt sogar etwas über (bei *acutus*). Hinten ist das Prosternum niedergedrückt. Das Mesosternum ist grubig eingedrückt, ungezähnt. Der Interkoxalfortsatz des Abdomens ist lang und vorn ziemlich spitz.

Die Beine sind kurz, die Schenkel dick, nicht gekeult, unten ungekantet, ungezähnt, die Schienen sind rund, ohne Kiele oder

Furchen, mit undeutlichen Enddornen. Die Tarsen sind ziemlich lang, an den vorderen sind die ersten Glieder viel breiter als die folgenden, die Glieder sind gerade abgeschnitten, das Klauenglied ist gestreckt.

Diese Gattung steht unter den Boletophagiden ganz isoliert, ihr nächster Verwandter ist *Danodema.* Sie hat flüchtige Aehnlichkeit mit den *Calymmus*-Arten aus Süd-Amerika, die ebenfalls ziemlich gestreckt sind. Bei diesen ist aber das Pronotum vorn in beiden Geschlechtern in ein Horn ausgezogen, an den Fühlern sind Glied 10 und 11 zu einem schwach getrennten Gliede vereinigt, das Prosternum fällt vorn nicht senkrecht ab, die Mittelschienen sind innen hakenförmig, und so weiter. Die Unterschiede von *Danodema* sind dort angegeben.

Die von mir gelieferten Beschreibungen von *D. acutus, D. cylindricus, D. amplus, D. sauteri, D. carinatus,* und *D. nodipennis* sind ausführlich, ihnen ist nichts hinzuzufügen. Neues Material ist nicht hinzugekommen.

Dicraeosis acutus Gebien. Tafel 1, Fig. 6.

Dicraeosis acutus GEBIEN, Arch. f. Naturg. 79 1913 (1914) Abt. A, Heft 9, 14.

Java, Preanger (*Sijthoff*); Toegoe (*Pasteur*); und Java, ohne genaueren Fundort (*Blume*).

In den Sammlungen Leyden, Veth, und Gebien.

Dicraeosis reticulatus Motschulsky.

Dicraeosis reticulatus MOTSCHULSKY, Etudes Entom. 8 (1859) 102.

Da die Beschreibung dieser mir unbekannten Art in einer schwer zugänglichen Zeitschrift erschienen ist, erfolgt hier eine Abschrift.

Linearis, subcylindricus, fortiter punctatus, nitidus, brunneus, corpore subtus nigrescens, palporum antennarumque basi testaceis; oculis magnis, nigris; capite transverso, antice subtruncato, crebre punctato; thorace capitis paulo latiore, elongato, fere parallelo, creberrime punctato, antice cuculliforme producto, concavo, subtus lato excavato, angulis anticis deflexis, acutiusculis, spiniformibus, posticis rectis; scutello angustato; elytris thorace latioribus, reticulato punctato-striatis, interstitiis alternis crenulato-elevatis, pedibus validiusculis, modice elongatis, tibiis tuberculatis; antennis brevissimis, 11-articulatis, fortiter clavatis, clava subovata, articulo ultimo brevissimo, obtuso; palpis maxill. valde securiformibus; abdominis segmento ultimo apice rotundato.—L. 2⅛ lat. ⅜ lin.

Au premier abord j'ai cru voir un Elmide allongé, mais les 4 articles au tarses postèrieurs m'ont convaincu que c'est aux Ténébrionites que l'insecte appartient.

Die Beschreibung passt ziemlich gut auf *D. nodipennis,* doch dürfte der Autor, hätte er wirklich diese Art vor sich gehabt, kaum die grossen Schwielen auf den Decken übersehen haben, ferner nennt er die alternierenden Zwischenräume, "crenulato-elevatis," es sind aber bei *nodipennis* gleichmässig gebildete Körner vorhanden. Auch ist meine Art grösser.

Dicraeosis granipes sp. nov.

Lang zylindrisch, Flügeldecken etwas glänzend.

Kopf ziemlich flach, das Epistom ist nicht aufgebogen, sondern sanft gerundet. Die Wangen haben Augenbreite, vor ihnen ist der Kopf in gleichmässigem Bogen gerundet, die Augen sind durch sie kaum eingeengt. Augenfurchen sind scharf und sehr tief; die Oberfläche ist rauh punktiert und dicht und sehr kurz gelb beborstet. Die Fühler haben eine stark abgesetzte 3-gliedrige Keule, deren letztes Glied länger als breit ist.

Halsschild viel länger als breit, vorn stark, kapuzenförmig, über den Kopf gezogen, Kapuze flach gedrückt, aber ohne scharfe Kanten. Basis sehr schwach doppelbuchtig, Oberfläche sehr tief grob punktiert; die Zwischenräume der Punkte haben sparsame, runde, glänzende Körner und ziemlich dichte, aber sehr kurze, gelbe Börstchen. Die Seiten sind vor den Hinterecken sehr schwach ausgeschweift. Die Vorderecken ragen sehr lang und spitz vor.

Die Flügeldecken sind parallelseitig, die Punkte der Streifen sind sehr grob, fast quadratisch, und durch ein undeutliches, feines Körnchen jederseits etwas eingeengt. Die Zwischenräume haben kleine, runde, glänzende Körner, die aber dem zweiten und vierten Zwischenraum an der Spitze fehlen. Alle Interstitien sind gleich hoch.

Das Prosternum ist vorn und hinten ganz niedergedrückt, vorn sehr hoch senkrecht; die Hüften liegen dort ganz frei, die Pleuren sind vorn jederseits durch eine scharfe Kante mit zwei Spitzen abgesetzt, einem stumpferen näher den Hüften und den scharf ausgezogenen Vorderecken. Das Mesosternum ist eingedrückt, das Metasternum fein punktiert und vereinzelt gekörnt, das Abdomen ist sehr fein punktiert. Die Beine sind kurz, Schenkel und Schienen kräftig gekörnt, an den Schienen fehlt eine deutliche Bewimperung.

Länge, 5.8 Millimeter.

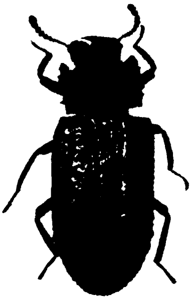
Ein Exemplar im Museum Dresden, von Mindanao, Davao (*Baker*).

Diese Art ist dem *D. bacillus* von Japan sehr ähnlich, aber sicher von diese verschieden, denn bei *bacillus* ist das Epistom stark aufgebogen, bei *granipes* nicht, der Halsschild ist nur punktiert, nicht granuliert. Von den Interstitien sind nur die abwechselnden gekörnt, und die Schienen haben nur innen Graneln.

ILLUSTRATION

TAFEL 1

FIG. 1. *Bradymerus aratus* Fairmaire. Vergrösserung 6 ×.
2. *Bradymerus acutangulus* sp. nov. Vergrösserung 6 ×.
3. *Bradymerus sijthoffi* sp. nov. Vergrösserung 6 ×.
4. *Bradymerus elongatus* (Perty). Vergrösserung 5 ×.
5. *Danodema subcalvum* sp. nov. Vergrösserung 5 ×.
6. *Dicraeosis acutus* Gebien. Vergrösserung 5 ×.



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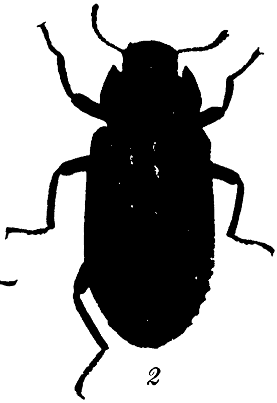

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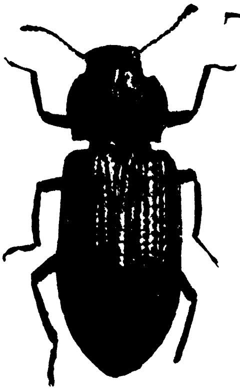

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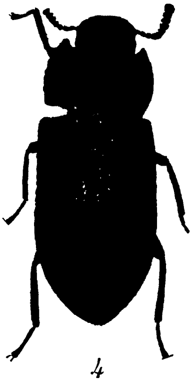

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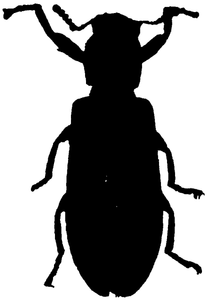

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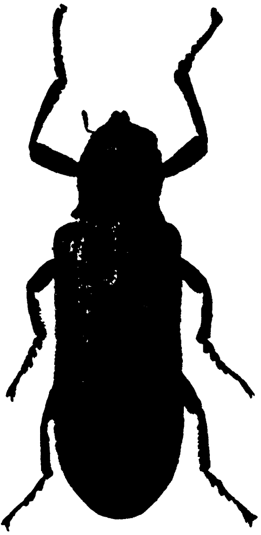

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TAFEL 1.

OF MICH.

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[New generic and specific names and new combinations are printed in **clarendon**; synonyms and names of species incidentally mentioned in the text are printed in *italic*.]

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NOTICE

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